Tampere University

Tina Hietasalo

MICROFOUNDATIONS OF PROCESS INNOVATION CAPABILITIES

Faculty of Engineering and Natural Sciences
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ABSTRACT

Tina Hietasalo: Microfoundations of Process Innovation Capabilities
Master of Science Thesis
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Today's organizations are faced with an increasingly demanding competitive environment. Pervasive digitalization, disruptive technologies, changing workplaces, more demanding customers, and increasing global competition accelerate the required pace for development. This emphasizes the value of process innovation capabilities for the overall competitiveness of an organization. In addition, there is a critical gap to be fulfilled in the literature. The management of product innovation has received substantial amount of theoretical and empirical attention, but our knowledge of process innovations and particularly how firms become process innovators remains underdeveloped. The situation is even more fascinating in the pharmaceutical industry, since previous studies have mainly focused on product innovation or the discovery and development of new drugs, rather than process innovations, which are generally more related to changes in manufacturing processes. However, the need for process innovations in the pharmaceutical industry can be described as essential for various stakeholders, such as patients, the industry, and the health care system, which together have an impact on the whole society.

The main purpose of this master's thesis is to identify the underlying microfoundations of process innovation capabilities of a multinational corporation's pharmaceutical Supply Center. Secondly, as an integral part of that purpose, this research aims to identify the fundamental mechanisms, which affect individuals' innovative work behavior. Thirdly, the research aims to explain how an internally crowdsourced innovation software influences individuals' innovative work behavior. To reach the overall purpose and to answer the research questions, the empirical results were used to guide the theoretical background. Later, the empirical results and the theoretical background were utilized simultaneously to develop the final conceptual framework for microfoundations of process innovation capabilities.

The findings of the identified microfoundations can be described to summarize the micro-level enablers for process innovation capabilities. The results establish how the case organization is on its way to become a process innovator and reveal some of the organizational and managerial activities through which the case organization introduces process innovations. Since managers cannot intervene the macro-level directly, gaining understanding of the microfoundations provides possibilities for managers to strengthen capabilities by influencing, for example, the underlying microfoundations or routines.

Furthermore, the results disclose several individual attributes, motivational factors, and organizational conditions that were linked with innovative work behavior. This information gives guidance for managers to enhance, for example, the organization-wide motivation and, thus, foster process innovation capabilities throughout the organization. To conclude, the results also highlight the positive effects of internally crowdsourced innovation management software, which has yet remained a rather unexplored field. To summarize, this master's thesis presents a holistic view of the microfoundations of process innovation capabilities by combining theory and empirical results of innovative work behavior, the related effects of innovation management software, and the overall organizational context.

Keywords: process innovation, innovation capabilities, microfoundations, innovation management, innovative work behavior, continuous innovation, innovation management software, computer aided innovation, pharmaceutical manufacturing

TIIVISTELMÄ

Tina Hietasalo: Prosessi-innovaatiokyvykkyyksien lähtökohdat
Diplomityö
Tampereen yliopisto
Tuotantotalouden diplomi-insinöörin tutkinto-ohjelma
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Tämän päivän organisaatioiden kilpailuympäristö on jatkuvassa murroksessa. Kokonaisvaltainen digitalisaatio, uudet disruptiiviset teknologiat, muuttuvat työpaikat, vaativammat asiakkaat ja kiristyvä globaali kilpailu pitävät yllä jatkuvaa painetta kehittyä. Tämä kasvava kehityspaine korostaa prosessi-innovaatiokyvykkyyksien arvoa koko organisaation kilpailukyvyn ja jatkuvuuden näkökulmasta. Prosessi-innovaatiokyvykkyyksien kiistattomasta arvosta huolimatta, ne ovat jääneet aiemmissa akateemisissa julkaisuissa taka-alalle. Siinä missä tuoteinnovaatioiden johtaminen on saanut merkittävästi sekä teoreettista että empiiristä huomiota, tietämyksemme prosessi-innovaatioista ja siitä miten yritykset kehittyvät prosessi-innovaattoreiksi on edelleen puutteellista. Tämä aihealue on erityisen mielenkiintoinen juuri lääketeollisuuden näkökulmasta, sillä kyseisellä toimialalla on aiemmin keskitytty vahvasti nimenomaan tuoteinnovaatioihin ja uusien lääkkeiden kehittämiseen, tyypillisesti tuotantoprosessien edistämiseen yhdistettävien prosessi-innovaatioiden sijaan. Lääketeollisuuden tarve prosessi-innovaatioiden vahvistamiselle on ilmeinen myös eri sidosryhmille, kuten potilaille, itse toimialalle, terveydenhuoltojärjestelmälle ja näiden kautta myös koko yhteiskunnalle.

Tämän diplomityön ensisijaisena tarkoituksena on identifioida suuren monikansallisen yhtiön erään tuotantolaitoksen prosessi-innovaatiokyvykkyyksien lähtökohdat. Toiseksi, integroituna osana edellä mainittua tarkoitusta, tämä työ pyrkii tunnistamaan yksilön innovaatiokäyttäytymisen taustalla olevia mekanismeja. Kolmanneksi, työ pyrkii selvittämään miten sisäisesti joukkoistettu innovaatio-ohjelmisto vaikuttaa yksilön innovaatiokäyttäytymiseen. Työn tarkoituksen saavuttamiseksi ja tutkimuskysymyksiin vastaamiseksi, empiirisiä tuloksia käytettiin ohjaamaan teoreettista osuutta. Myöhemmin sekä empiirisiä tuloksia että teoreettista osuutta käytettiin samanaikaisesti prosessi-innovaatiokyvykkyyksien lähtökohtien viitekehyksen luomiseen.

Työn tuloksena identifioitujen lähtökohtien voidaan myös ajatella kuvaavan prosessi-innovaatiokyvykkyyksien mikrotason mahdollistajia. Tulokset osoittavat miten case organisaatio on kehittymässä prosessi-innovaattoriksi ja millaisia organisationaalisia ja johdollisia toimia organisaatiossa käytetään prosessi-innovaatioiden tukemisessa. Tietämys prosessi-innovaatioiden lähtökohdista antaa mahdollisuuksia edesauttaa kyseisten kyvykkyyksien vahvistamisessa, sillä johtajat eivät pysty suoraan vaikuttamaan makrotason prosessi-innovaatiokyvykkyyksiin. Sen sijaan vahvistaminen tapahtuu vaikuttamalla esimerkiksi keskeisimpinä pidettyihin lähtökohtiin ja rutiineihin.

Lisäksi, tulokset tuovat ilmi useita yksilötason ominaisuuksia, motivaatiotekijöitä ja organisationaalisia olosuhteita, jotka voidaan yhdistää yksilön innovaatiokäyttäytymiseen. Tämä tieto voidaan nähdä eräänlaisena pohjatietona organisaation päättäjille, jotta he voivat tukea esimerkiksi koko organisaation laajuista motivaatiota ja sitä kautta edesauttaa prosessi-innovaatiokyvykkyyksien vahvistumista. Lopuksi, tulokset korostavat myös sisäisesti joukkoistetun innovaatio-ohjelmiston positiivisia vaikutuksia. Kyseinen osa-alue on ollut toistaiseksi melko tutkimaton. Yhteenvetona voidaan mainita, että tämä diplomityö esittää kokonaisvaltaisen kuvan prosessi-innovaatiokyvykkyyksien lähtökohdista yhdistämällä empiirisiä tuloksia ja teoriaa yksilön innovaatiokäyttäytymisestä, innovaatio-ohjelmiston positiivisista vaikutuksista sekä koko organisaation laajuisesta kontekstista.

Avainsanat: prosessi-innovaatiot, innovaatiokyvykkyydet, lähtökohdat, innovaatiojohtaminen, innovaatiokäyttäytyminen, jatkuva innovointi, innovaatiojohtamisen ohjelmisto, tietokoneavustettu innovointi, lääketeollisuus

PREFACE

This master's thesis process has been both challenging and rewarding. I am truly grateful for being granted this opportunity to do my thesis on such an interesting and relevant topic, which simultaneously integrates themes close to my heart. Integrating strategy, innovation, and psychology with a hint of digitalization was truly a pleasure. The overall master's thesis process included many PDCA cycles combined with highs and lows and various enlightening experiences.

I want to thank my supervisor Pasi Tervahartiala, Professor Saku Mäkinen, the whole encouraging Operational Excellence Team, and other colleagues on Bayer Turku site. Your support, care, and advice were truly appreciated during this demanding process. Furthermore, I want to give credit to my amazing family, relatives, and friends, who have supported me throughout my studies. Finally, I want to thank my partner, who was always able to plant a seed of hope, positivity, and encouragement, when I needed it the most.

To conclude, an advisory guideline from Mahatma Gandhi: "Live as you were to die tomorrow. Learn as if you were to live forever."

Turku, 24.5.2019
Tina Hietasalo

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LIST OF SYMBOLS AND ABBREVIATIONS

CAI	Computer-aided Innovation
CI	Continuous Improvement or Innovation
DCV	Dynamic Capabilities View
FDA	US Food and Drug Administration
GMP	Good Manufacturing Practices
IMS	Innovation Management Software
IWB	Innovative Work Behavior
LCM	Life Cycle Management
MNC	Multinational Corporation
NPD	New Product Development
OE	Operational Excellence
PIC	Process Innovation Capability
R&D	Research and Development
RBV	Resource-Based View
SC	Supply Center

1. INTRODUCTION

Pervasive digitalization, disruptive technologies, changing workplaces, more demanding customers, and increasing global competition have left their mark on the competitive environment of today's organizations – with no end in sight. As the pace of change in the environment accelerates, innovation and creativity become even more vital to the successful performance of an organization (Teece 2007; Anderson, Potočnik & Zhou 2014; Madonsela, Mukwakungu & Mbohwa 2017). Furthermore, Anderson and colleagues (2014) point out that the issue of how to foster creativity and innovation in a systematic, dynamic, and sustainable manner still remains a persistent challenge for organizations. However, just imagine how some well-known Japanese firms have contributed to their competitiveness by their process innovation management capabilities and how the world has tried to learn from their philosophies and approaches ever since (Bhoovaraghavan, Vasudevan & Chandran 1996). This statement highlights the value of strong process innovation capabilities for the overall competitiveness of organizations. Process innovation capabilities have naturally always been valuable, yet their value can be recognized as increasing in the era of digitalization, which forces organizations to change and develop at a progressively demanding pace.

So far, we have established that process innovation capabilities can be highly valuable for an organization. However, the question of how an organization can develop these valuable capabilities has not yet been answered adequately. Therefore, the main goal of this thesis is to explore and reveal some of the underlying microfoundations of process innovation capabilities. The knowledge of these fundamental building blocks can serve as a starting point for an organization in developing process innovation capabilities. The explorative research presented in this thesis was conducted in one of Bayer's pharmaceutical manufacturing Supply Centers located in Turku, Finland. The pharmaceutical manufacturing environment makes the subject even more fascinating, since the industry has been generally recognized to be lagging behind other industries, such as consumer goods, electronics, and food, in developing more modern manufacturing practices (Price 2013, 2014). Thus, the overall road to process innovation success can be described as more demanding for pharmaceutical manufacturing organizations. Next, this subject is discussed briefly.

Previously, pharmaceutical manufacturing has not been recognized as a possible source for competitive advantage, unlike various R&D efforts (Price 2013). Drug manufacturing is generally acknowledged as expensive, inefficient, and non-innovative (Price 2014). Price (2013, 2014) depicts this process innovation deficiency within pharmaceutical industry as being highly negative for patients, providers, the pharmaceutical industry, and the health care system and society as a whole. According to Price (2013, 2014) the reasons behind this innovation deficiency are complex. He points out that the whole pharmaceutical industry has high regulatory barriers to change. Moreover, he states that there is an old industry mindset that resists altering regulator-approved and validated procedures. In addition, the regulators, such as the US Food and Drug Administration (FDA), interfere with manufacturing innovation by raising powerful barriers to innovative change, both before and after drug approval (Price 2013, 2014). These aspects combined lead to various challenges at different levels of the organization.

Therefore, when seeking approval, firms tend to avoid introducing, for example, new technologies (Price 2014). According to Price (2014), this is based on historically justified fears of pre-approval delay from reviewers cautious of new technology. In addition, he mentions that even after approval, changes to manufacturing processes face procedural complications that can prevent continuous process improvement. Furthermore, as mentioned, patent law does not reward manufacturing innovation and the FDA regulations complicate the equation (Price 2014). Thus, according to Price (2014), the pharmaceutical manufacturing firms tend to not innovate, since the incentives are much weaker for innovative manufacturing than for innovative drug discovery. However, on the other side of the coin, this situation provides significant opportunities for those firms that are willing to address technical and regulatory complications (Price 2013). The solution to this inbuilt problem in the industry is complex, and it will need to include changes in the corporate focus, regulatory reform, and perhaps even greater incentives that reward innovation in manufacturing (Price 2013, 2014). This thesis will elaborate key aspects of the process innovation journey of the case organization within the challenging pharmaceutical manufacturing environment.

1.1 Background and Motivation

From a theoretical perspective, the topic of this thesis has various contributions to existing body of literature. The overall themes of the research are summarized in the Figure 1 below.

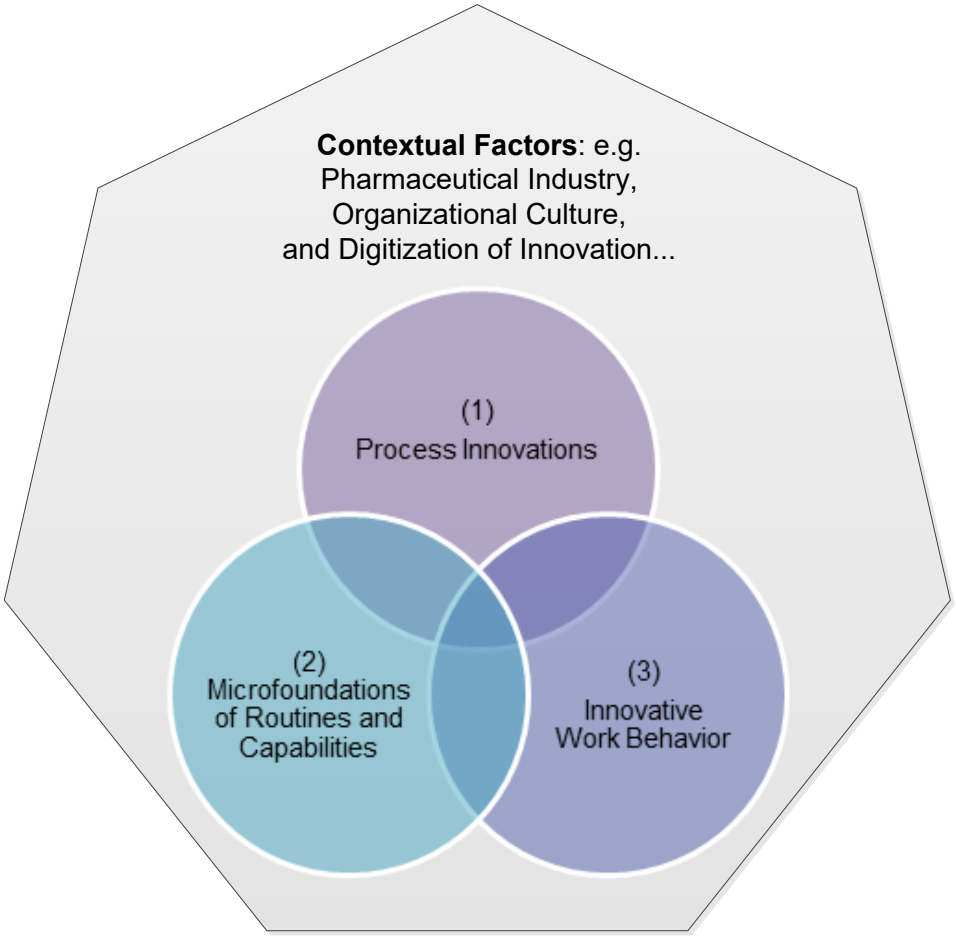

Figure 1. *Themes and contextual factors related to the research.*

Firstly, especially in today's digitized world, process innovations are a highly relevant and fascinating theme. Secondly, there is also a critical gap to be fulfilled in the literature. The management of product innovation has received substantial amount of theoretical and empirical attention, but our knowledge of process innovations and particularly how firms become process innovators remains underdeveloped (Keupp, Palmié & Gassman 2012; Piening & Salge 2015; Marzi *et al.* 2017). In other words, our understanding of the antecedents, contingencies, and effects of process innovations remains limited (Hervas-Oliver, Sempere-Ripoll & Boronat-Moll 2014; Piening & Salge 2015). Furthermore, Keupp and colleagues (2012) and Piening and Salge (2015) have emphasized that particularly critical gap in the literature resides in the lack of insight into the organizational and managerial activities through which firms introduce process innovations.

Furthermore, previous studies regarding the pharmaceutical industry have mainly focused on product innovation or the discovery and development of new drugs, rather than process innovations, which are generally more related to changes in the manufacturing processes (Lugovoi, Andritsos & Senot 2018). However, on behalf of the value of process innovation speaks its role in supporting product innovation and overall operational performance of, for example, the production processes (De Figueiredo & Kyle 2006; Ballot *et al.* 2015). Moreover, Piening and Salge (2015, p. 80) have suggested that firms can increase the prospect of achieving process innovation success by engaging in various innovation activities. This has also been stated to be related to the financial performance of a firm (Piening & Salge 2015, p. 80). In addition, it should be acknowledged that manufacturing is a far greater cost driver for the pharmaceutical industry than is generally acknowledged (Price 2013, 2014).

The next Figure 2 demonstrates the distribution of articles by the type of innovation investigated in the literature overall (Becheikh, Landry & Amara 2006). Becheikh and colleagues clearly highlight product innovation as the most studied topic in the field. 37 % of the articles focused solely on product innovation, whereas 43 % took also process innovations into consideration. But the main finding is that exclusively process innovation related articles account to only 1 % of the papers.

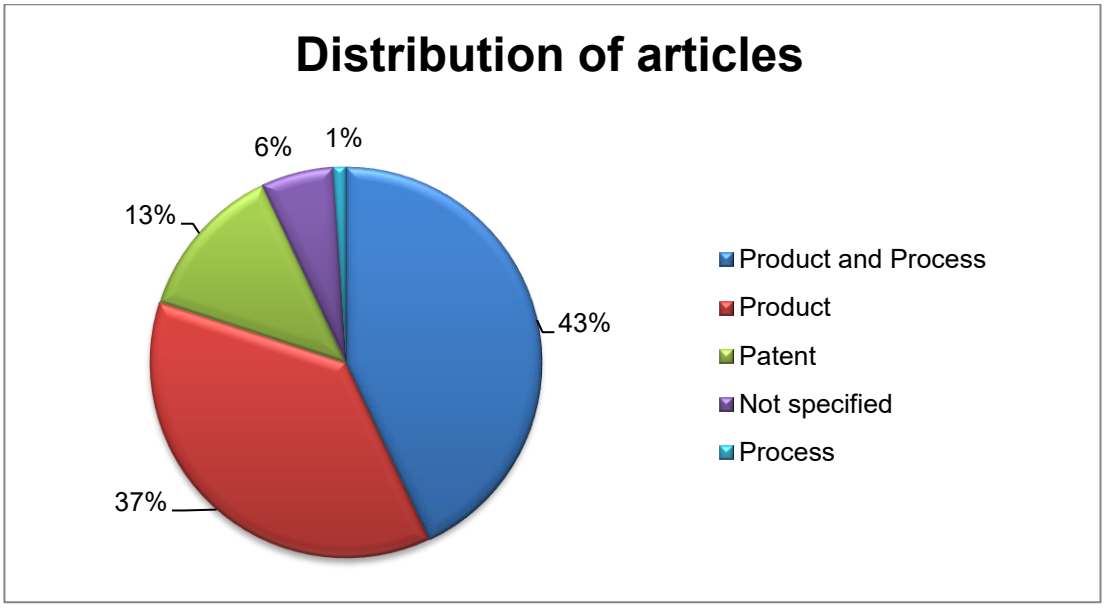

Figure 2. *Distribution of articles by the type of innovation investigated (adapted from Becheikh et al. 2006).*

Furthermore, the next Figure 3 illustrates possible future areas of research in the field of product and process innovation in manufacturing according to Marzi *et al.* (2017). The figure shows that one of the mentioned themes is dynamic capabilities and process innovation, which is integrated within the topic of this research.

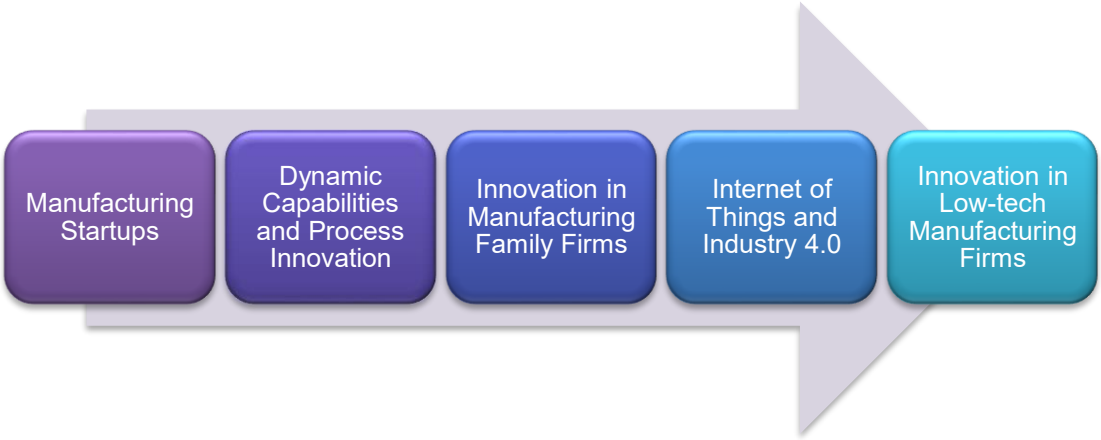

Figure 3. *Possible future areas of research in the field of product and process innovation in manufacturing (adapted from Marzi et al. 2017, p. 699).*

Moreover, previous literature has suggested that dynamic capabilities framework holds premise for advancing knowledge of process innovation (Piening & Salge 2015, p. 81; Marzi *et al.* 2017). However, the research field of capabilities has remained surprisingly uninterested about process innovations (Woiceshyn & Daellenbach 2005), even though process renewal or innovation is by definition the fundamental function of dynamic capabilities (Zollo & Winter 2002; Piening & Salge 2015). Instead, process innovations could be perceived as a lens to analyze the broader phenomenon of organizational capability building, which includes how firms create, implement, and replicate new operating routines (Pisano 1994; Piening & Salge 2015). Therefore, approaching process innovations from the viewpoint of capabilities is appropriate and serves as a contribution. In this thesis, these aspects are approached by focusing on microfoundations of process innovation capabilities. Studying microfoundations grants the opportunity to understand how the process innovation capabilities emerge and, thus, what are the underlying factors that contribute to the process innovation success. Next, the microfoundational approach will be elaborated in more detail.

Naming a certain type of capability does not reveal the fundamental components, individuals, or processes underlying the particular capability. Therefore, many authors and papers have agreed that while attempting to investigate the subject of, for example, specific dynamic capabilities in more depth, the traditional macro-level analysis is not sufficient (Felin & Foss 2005; Teece 2007; Foss 2009; Felin *et al.* 2012*;* Foss *et al*. 2012; Barney & Felin 2013; Felin, Foss & Ployhart 2015; Foss & Pedersen 2016). Thus, the perspective shifts from dynamic capabilities to routines, capabilities, and microfoundations of capabilities, which allows the micro-level analysis utilized in this research (Felin & Foss 2005; Teece 2007; Foss 2009; Felin *et al.* 2012*;* Foss *et al*. 2012; Barney & Felin 2013; Felin *et al.* 2015; Foss & Pedersen 2016). In practice, the emphasis will be more on the individual-level, which consists of, for example, individuals' skills, abilities, and the interactions among individuals (e.g. Felin & Foss 2005; Felin *et al.* 2012).

Furthermore, various authors have stated that there are frequent calls for microfoundations and related empirical work in strategy and other fields (e.g. Lippman & Rumelt 2003; Felin & Foss 2005; Felin *et al.* 2012; Barney & Felin 2013; Felin *et al.* 2015). The choice of approach is also backed by the fact that heterogeneous human capital is often seen as a critical underlying mechanism for capabilities (e.g. Coff & Kryscynski 2011, p. 1429). To summarize, approaching

the theme of process innovation capabilities from the perspective of microfoundations adds to the extant literature regarding microfoundational exploration.

In addition, this research contributes to the extant literature on individual innovative work behavior and some innovation related contextual factors within an organization. In other words, the research highlights aspects of the interplay of factors at different organizational levels. This advances the existing discussion since, for example, Crossan and Apaydin (2010) call for multi-level research that examines the relationship among variables that exist at different levels, such as, individual, group, or organizational levels. Furthermore, employee innovation emerges from the interaction of personal and contextual factors, such as individual characteristics, intrinsic job factors, group factors, relationships at work, and organizational factors, which either encourage or inhibit employee's innovation related activities (Janssen 2005). Thus, the multi-level perspective is necessary in order to gain a holistic understanding of the microfoundations underlying process innovation capabilities. In addition, despite the prior attempts to explore the determinants that influence employee innovative behavior, the advances are still limited (Černe *et al*. 2014; Shalley & Zhou 2008 as cited in Maqbool, Černe & Bortoluzzi 2018). To summarize, this research gives insight into important individual and contextual factors related to innovative work behavior, process innovation capabilities, and innovation culture.

To add to the above discussed topics and the themes presented in the Figure 1, this research provides insight into the new research area of digitization of innovation. Overall, digitalization can be recognized to have penetrating effects on innovation, which results in a critical need for novel theorizing on digital innovation management (Nambisan *et al.* 2017, p. 223). Furthermore, the research area for the effects of digital tools for innovation is at its infancy. This research reveals empirical findings related to the influence of an internally crowdsourced innovation management software on the microfoundations of process innovation capabilities, for example, in the form of individual behavior. To the researcher's knowledge, this is yet an unexplored field.

To summarize all the contributions discussed above, this research has wide contribution network to existing literature in various disciplines and topics. First, according to the existing literature, the process innovation concept and the microfoundational approach adopted in this research both require more in-depth exploration. Second, the overall human agency underlying routines and capabilities and how the macro-level context influences the micro-level are important contributions, too. Third, in existing literature, there have been attempts to explore determinants that influence employee innovative behavior, but those results are still limited. Thus, this research reveals some aspects related to that topic as well. Finally, this research highlights the effects of internally crowdsourced digital innovation management software, which connects all the employees within the organization to process innovation related activities, such as knowledge integration. This research area for the effects of digital tools for innovation is at its infancy. To conclude, studying all the above within a pharmaceutical manufacturing environment adds to the list of contributions.

1.2 Research Questions

First, the main purpose of this research is to identify the underlying microfoundations of process innovation capabilities of a multinational corporation's pharmaceutical manufacturing Supply Center. Second, as an integral part of that purpose, this research aims to identify the underlying mechanisms, which affect individuals' innovative behavior. Furthermore, the research aims to explain how an internally crowdsourced innovation software has influenced individuals' innovative behavior. For example, Amabile (1997) has found that working environments have an im-

pact on creativity by affecting underlying components that contribute to creativity, which represent a basic source for organizational innovation. Thus, given the context, it is self-evident that the above-mentioned goals are entwined and build more or less on each other. To summarize the above, this research aims to answer the following research questions:

...What are the microfoundations of process innovation capabilities?

…What are the underlying individual mechanisms to innovate?

…How does an internally crowdsourced innovation management software influence individuals' innovative behavior?

Innovations are a broad topic with linkages to other broad streams of literature, such as knowledge management and organizational learning. Therefore, it was crucial to build proper frames for the research. As mentioned before, since the knowledge of process innovations is still underdeveloped, it was appropriate to discharge the traditional product development activities from the scope of this research and focus solely on process innovations within the case organization (Piening & Salge 2015; Marzi *et al.* 2017). However, in order to gain a more comprehensive insight on process innovations, a few employees from the R&D department were interviewed as well. The research design with justifications will be elaborated thoroughly in the Chapter 3.

The flow of the practical work can be presented as 7 key objectives: (1) to identify the potential sources of microfoundations of process innovation capabilities and the mechanisms of individuals' innovative behavior through the critical literature review; (2) to gather qualitative data of the microfoundations within the case organization; (3) to gather qualitative data of the underlying mechanisms of individuals' innovative behavior; (4) to gather qualitative data of how the innovation management software has influenced individuals' innovative behavior; (5) to complete and review the literature review based on the empirical findings; (6) to comprise a conceptual framework based on the interplay of literature and empirical results, and (7) to discuss how the results come together and what new insights the research provides.

1.3 Case Organization and the Industry

This subchapter will elaborate some of the organizational and contextual factors related to the operating environment of the case organization. Figure 4 summarizes some key elements that have direct or indirect effects on the research questions.

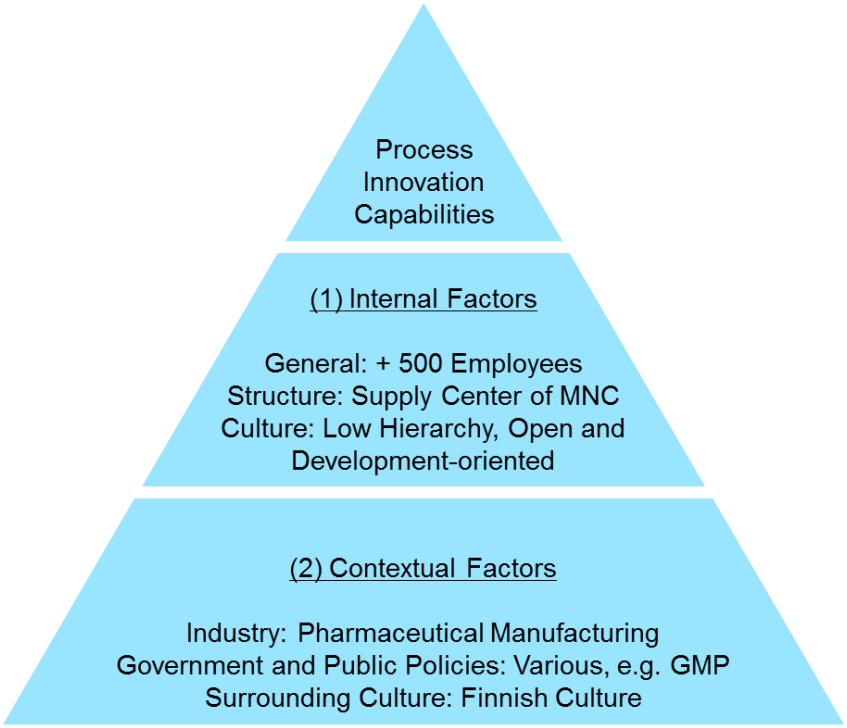

Figure 4. *Modified framework for presenting the internal and contextual factors (adapted from Becheikh et al. 2006).*

First, as shown in the Figure 4 above, the case organization has over 500 employees. Second, the case organization is a pharmaceutical manufacturing Supply Center (SC) of a multinational corporation (MNC). Third, the overall culture can be described as open, low hierarchy, and pro-development. The culture-related empirical findings are presented in more detail in the Sub-chapter 4.5. As implied earlier, the analysis emphasizes the individual-level, but the contextual factors influence the findings as well, and, thus, will be included in the discussions. Furthermore, the Supply Center and the R&D department constitute the subsidiary Bayer Oy. Both the Supply Center and the R&D department operate at the same location in Turku. To note, the proximity between the SC and the R&D department provides opportunities for creating competitive advantage.

As briefly discussed, the pharmaceutical industry is highly regulated (Price 2013, 2014). The regulations have various direct and indirect implications to operations and, especially, innovations at different levels of the organization. The most well-known guidelines in the pharmaceutical industry are Good Manufacturing Practices (GMP) and one of the most famous authorities is US Food and Drug Administration (FDA). To note, Piening and Salge (2015, p. 80) have claimed that industry membership and the nature of innovation process, meaning internal generation, external adoption, or co-creation of an innovation, are key contingency factors. Furthermore, the authors comment that the findings have important theoretical and practical implications for managing new process introduction (Piening & Salge 2015). Thus, as implied, the contextual factors in this research are considered simultaneously with the empirical results, even though the emphasis is on the individual-level.

1.4 Structure of the Research

The thesis comprises of six different chapters, which are: Introduction, Theoretical Background, Research Design, Empirical Findings, Discussion, and, finally, Conclusions. The overall struc-

ture of the thesis is summarized in the Figure 5. As mentioned in the previous subchapter, the Supply Center is a part of a subsidiary of the MNC, which could be perceived as having direct and indirect influence on process innovation capabilities of the SC. However, this relationship is not emphasized in the literature review or in the findings. The level of analysis is kept primarily on the individual-level and how the process innovation capabilities emerge through the identified microfoundations in the case organization. In other words, this thesis does not concentrate on the subsidiary-MNC relationship. To add, regarding the results of this thesis, it is appropriate to note that since dynamic capabilities are the source of competitive advantage for firms, the level of analysis will be kept at a suitable generality.

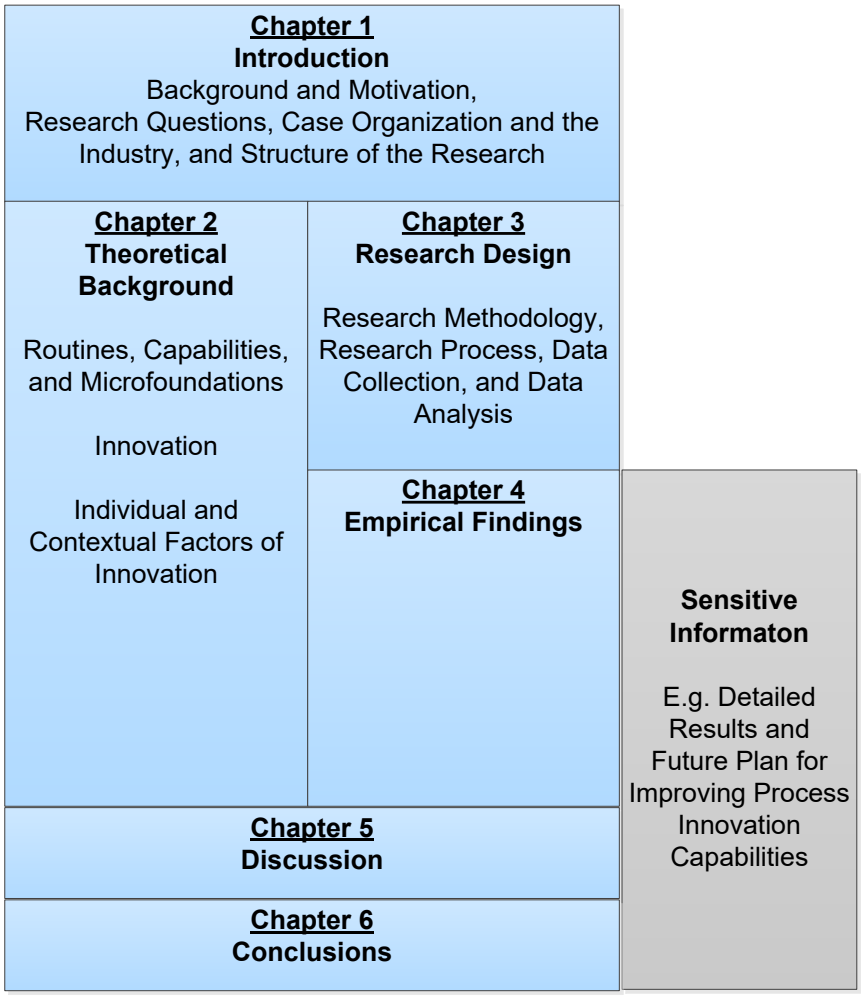

Figure 5. *Summarized overview of the structure of the research.*

The Chapter 1 presents the Introduction, which concentrates on the background and motivation, research questions, case organization, and the structure of the research. The Chapter 2 presents the Theoretical Background, which comprises of three distinct themes. First, the chapter discusses routines, capabilities, and microfoundations. Second, the chapter discusses innovation and, third, it elaborates the individual and contextual factors related to innovation. To summarize, the second chapter aims to provide a sufficient foundation for the empirical part of the research and, at the same time, link this research to current academic literature.

According to Whetten (1989) the purpose of the critical literature review is to answer four questions: What are the variables or concepts the theory examines? How are these variables or concepts related? Why are these variables related? Who does this theory apply to; where does this theory apply; when does this theory apply? As briefly mentioned earlier, this research will

draw its theoretical background primarily from three distinctive streams of literature: strategy, innovation, and a combination of psychology and organizational behavior. Strategically the focus will be on routines, capabilities, and microfoundations. Regarding innovation, the focus will be on process innovation, continuous innovation, and individuals' innovative work behavior. Regarding psychology and organizational behavior, the relevant subjects for the research are behavior, learning, cognition, and motivation.

Next, the Chapter 3 discusses various factors related to the research design. It begins with a discussion of the research methodology and continues by explaining the research process, data collection, and data analysis. Then, the Chapter 4 summarizes the empirical findings that were made during the data collection. The chapter is divided into six different themes to keep the chapter easily approachable for the reader. First, the chapter elaborates the findings related to the perceived value of process innovation. Second, the antecedents of process innovation capabilities are presented. Third, the subchapter discusses the facilitators of process innovations. Fourth, the individual perspective on process innovation capabilities is elaborated. Fifth, the focus shifts from the individual-level to the organizational-level, when this subchapter discusses the features of the organizational culture and climate. Sixth, the subchapter evaluates the effects of internally crowdsourced innovation management software on the individuals' innovative work behavior.

After exhibiting the empirical findings, the findings are discussed in the Chapter 5. The discussion focuses on three distinct perspectives. First, it establishes the identified microfoundations of process innovation capabilities. Next, it discusses the individual-level results by mirroring the results to existing literature. Last, the chapter focuses on the effects of digitalization on innovation. The final Chapter 6 provides the Conclusions. The subchapters of the Chapter Conclusions focus on the contribution to existing literature, main findings, reliability and validity, managerial implications, and the future research.

2. THEORETICAL BACKGROUND

This chapter presents the theoretical background for this master's thesis. The theoretical background is mainly drawn from three streams of literature: strategy, innovation, and a combination of psychology and organizational behavior. The Subchapter 2.1 begins with explaining the all-embracing viewpoint from which the overall topic is analyzed from. It builds on strategy literature with a focus on routines, capabilities, and microfoundations. The Subchapter 2.2 provides more background on specific topics under the umbrella of innovations. The innovational focus will be on process innovation, continuous innovation, and process innovation capabilities. After providing the viewpoint and the substance, the Subchapter 2.3 discusses some of the relational and contextual factors that are highly related to the overall topic of process innovation capabilities. To summarize, this Chapter 2 aims to provide a foundation for the empirical part of the research and, at the same time, link this research to extant academic literature. The outer layer of the framework builds simultaneously with the different subchapters throughout this chapter. The framework will be perfected into a final guiding conceptual framework by integrating empirical findings in the Chapter 5.

2.1 Routines, Capabilities, and Microfoundations

In strategic management, understanding sources of sustained competitive advantage has been a constitutional area of research for a lengthy period of time (Porter 1985; Barney 1991). Consequently, one of the most fundamental questions of strategic management tries to answer what enables organizations to achieve and sustain competitive advantage (e.g. Teece, Pisano & Shuen 1997). Various authors and papers (e.g. Felin & Foss 2005; Teece 2007; Foss 2009; Felin *et al.* 2012; Foss *et al*. 2012; Barney & Felin 2013; Winter 2013; Felin *et al.* 2015; Foss & Pedersen 2016) have discussed ways to reveal the fundamental origins of organizational and competitive heterogeneity beyond macro concepts, such as routines and capabilities. The above-mentioned authors and papers suggest that in order to further our understanding of what drives the differences in the behavior and performance of firms to the next level, there is a need to decompose macro constructs. In other words, routines and capabilities can be perceived as being too "macro" for in-depth analysis of the origins of, for example, dynamic capabilities within an organization, which leads us to embrace microfoundational approaches (e.g. Felin & Foss 2005; Felin *et al.* 2012, p. 1351–1352; Foss *et al*. 2012; Barney & Felin 2013; Felin *et al.* 2015; Foss & Pedersen 2016). This kind of explanatory task has relevance even beyond strategic management, as routines and capabilities are important components in various management fields, such as international management, technology strategy and management, and organizational studies (e.g. Felin *et al.* 2012, p. 1352).

Before diving into the depths of the above-mentioned constructs, some definitions are needed to clarify the overview of the following approach. Basic terms include resources, resource-based view (RBV), routines or competencies, capabilities, and dynamic capabilities. When discussing competitive advantage generating resources, Teece and colleagues (1997, p. 516) have defined them as firm-specific assets, like specialized production facilities or engineering experience, which are difficult if not impossible to imitate (see also Eisenhardt & Martin 2000). In addi-

tion, such assets are also perceived as difficult to transfer among firms because of transaction and transfer costs, and because the assets may contain tacit knowledge (Teece *et al.* 1997, p. 516). The resource-based view, on the other hand, can be introduced as strategical perspective based on the exploitation of these firm specific assets (Teece *et al.* 1997, p. 516). According to Eisenhardt & Martin (2000, p. 1105), RBV can be recognized as a theoretical framework for determining how competitive advantage can be achieved and sustained. Moreover, routines or competencies, capabilities, and dynamic capabilities are also related to the same strategical context. To note, routines and competencies demonstrate the same phenomenon, meaning that routines are recognized as competences and vice versa. In the following body text of this thesis, the terms will not be mentioned parallelly anymore.

Furthermore, Teece and colleagues (1997, p. 516) have disclosed that organizational routines and processes emerge when firm-specific assets are accumulated into unified bundles spanning individuals and groups, so that they enable special activities to be performed. In order to clarify this definition, Teece and colleagues (1997, p. 516) have recognized quality, miniaturization, and systems integration as examples. These kinds of routines are applicable, for example, across various product lines and may also be extended outside through alliance partners (Teece *et al.* 1997, p. 516). Another widely accepted definition states that routines are "repetitive, recognizable patterns of interdependent actions, carried out by multiple actors" (Feldman & Pentland 2003, p. 95). Core competencies, on the other hand, are usually referred as competences that define a firm's fundamental business as core, and they are determined by analyzing a range of firm's and competitors' products and services (Teece *et al.* 1997, p. 516). To add, according to the definition by Teece and colleagues the value of a core competence can be enhanced with applicable complementary assets.

In turn, Winter (2003, p. 991) has declared that organizational or ordinary capability can be defined as a higher-level routine or collection of routines. According to Winter (2003, p. 991) these routines or collections of routines and their implementing input flows provide organization's management a set of decision options for producing desired outputs. This definition suggests that learning, experience, resources, and routines can be unified to form capabilities (Felin *et al*. 2012, p. 1355). However, mere routines can also be defined as capabilities in certain situations (e.g. Felin *et al*. 2012, p. 1355). One way to demonstrate the input possibilities for capabilities is demonstrated in the Figure 6 below.

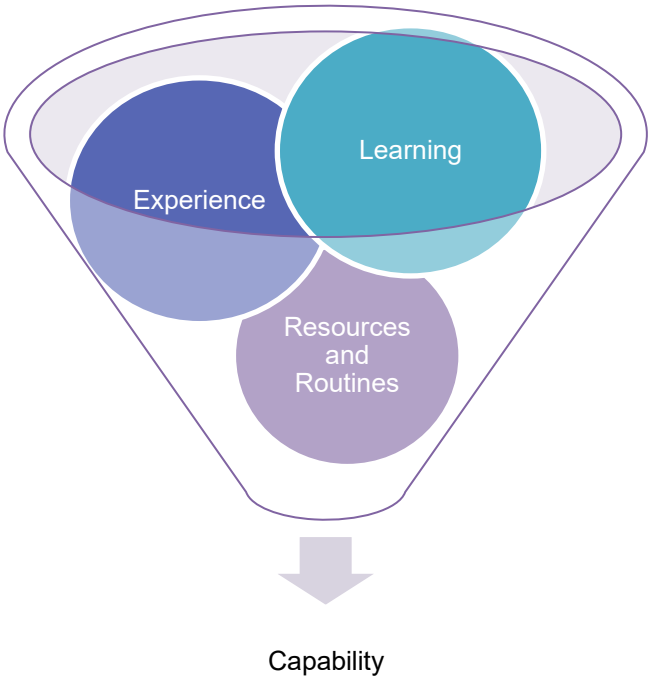

Figure 6. *Demonstrational inputs for capabilities (Winter 2003; Felin et al. 2012).*

Furthermore, how are the above explained ordinary capabilities related to dynamic capabilities? According to the observations of Eisenhardt and Martin (2000, p. 1106), dynamic capabilities consist of, for example, specific strategic and organizational processes like product development, alliancing, and strategic decision-making. Eisenhardt and Martin (2000 p. 1106) also specify that dynamic capabilities create value for firms within dynamic markets by actions that manipulate the existing resources into new value generating strategies. Dynamic capabilities have also been defined as the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environment (Teece & Pisano 1994; Teece *et al*. 1997, p. 516). In addition, according to Eisenhardt and Martin (2000), since the mere functionality of dynamic capabilities is imitable across firms, the real value in terms of competitive advantage lies in the specific "resource configurations" that they create, not in the capabilities themselves. Therefore, dynamic capabilities are necessary, yet not satisfactory, conditions for competitive advantage (Eisenhardt & Martin 2000). To conclude, the Table 1 presents a summary of the essential terms and definitions that will be used throughout the thesis.

Table 1. *Essential terms and definitions.*

Term	Definitions and References
Resource	Firm-specific assets, like specialized production facilities or engineering experience, which are difficult if not impossible to imitate (Teece *et al*. 1997, p. 516). In addition, according to Teece and colleagues (1997, p. 516), such assets are problematic to transfer among firms because of transaction and transfer costs, and because the assets may include tacit knowledge.
Routine or Competence	Organizational routines or competences emerge when firm-specific assets are accumulated into unified bundles spanning individuals and groups so that they enable special activities to be performed (Teece *et al.* 1997, p. 516). Routines can also be identified as "repetitive, recognizable patterns of interdependent actions, carried out by multiple actors" (Feldman & Pentland 2003, p. 95).
Capability	Organizational, or ordinary, capability can be defined as a higher-level routine or collection of routines. Furthermore, these routines or collections of routines and their implementing input flows provide organization's management a set of decision options for producing desired outputs. (Winter 2000, p. 983, 2003 p. 991) In addition, mere routines can also be capabilities whereas experience and resources may contribute to capabilities as inputs (Felin *et al.* 2012, p. 1355).
Dynamic Capability	Dynamic capabilities consist of, for example, specific strategic and organizational processes like product development, alliancing, and strategic decision-making. They are also seen as creating value for firms within dynamic markets by actions that manipulate the existing resources into new value generating strategies. (Eisenhardt & Martin 2000, p. 1106) Dynamic capabilities have also been defined as the firm's ability to integrate, build, and reconfigure internal and external competence to address rapidly changing environment (Teece & Pisano 1994; Teece *et al*. 1997, p. 516).

2.1.1 Microfoundations

Microfoundations are a complex, widely debated, but increasingly interesting research agenda. Originally, the heritage of the notion of "microfoundation" is deeply rooted in social sciences (e.g. Felin *et al.* 2012; Barney & Felin 2013; Felin *et al.* 2015). The discussion began with a question that has been on the center stage of social sciences since the dawn of the field – the question of the dominance of micro versus macro foundations (e.g. Felin *et al.* 2012; Barney & Felin 2013; Felin *et al.* 2015). However, around in 1960's, the emergence of microfoundations approach became more comprehensive (Felin *et al.* 2012). Within strategy literature the notion of microfoundations was arguably first applied by Lippman and Rumelt, who presented the microfoundations of the resource-based view (Lippman & Rumelt 2003; Foss & Pedersen 2016). Since then, the notion of microfoundations has received increasing interest also in the field of strategy (Felin & Foss 2005; Foss 2009; Felin *et al.* 2012; Foss *et al*. 2012; Barney & Felin 2013; Foss & Lindenberg 2013; Felin *et al.* 2015; Foss & Pedersen 2016). Albeit the demand for microfoundations in strategy dates back more than a decade, the microfoundational work did not take off properly until 2010 (e.g. Foss & Pedersen 2016). Since then, many authors have suggested that there are frequent calls for microfoundations in strategy and other fields, and even though the discussion is not new, scholars are still struggling to reach a consensus of what microfoundations really are and are not (e.g. Felin & Foss 2005; Foss 2009; Felin *et al.* 2012; Foss *et al*. 2012; Barney & Felin 2013; Foss & Lindenberg 2013; Winter 2013; Felin *et al*. 2015; Foss & Pedersen 2016).

In the spotlight of microfoundations literature has been to unpack collective macro-level constructs to understand how individual-level factors impact organizations, how the interaction of individuals leads to emergent, collective, and organizational-level outcomes, and how micro actions and interactions mediate the relationship between macro-variables (e.g. Felin & Foss 2005; Foss 2009; Teece 2007; Felin *et al.* 2012; Foss *et al.* 2012; Barney & Felin 2013; Winter 2013; Felin *et al.* 2015; Foss & Pedersen 2016). Furthermore, Barney and Felin (2013, p. 144) have summarized the main idea as an attempt to systematically analyze the origins and nature of the macro: how choices and interactions create structure, the behavior of individuals within structures, and the role of individuals in shaping the evolution of structures over time. In addition, Barney and Felin (2013, p. 144) mention that the goal of "microfoundations program" is to reveal the origins and evolutions of microfoundations by examining how they emerge due to individual choices and social interaction. Explained in other words, microfoundations shift the causal arrow from macro-micro (1) or macro-macro (4) analysis to micro-macro analysis (3) (e.g. Felin & Foss 2005; Foss 2009; Barney & Felin 2013; Felin *et al.* 2015; Foss & Pedersen 2016). The Figure 7 illustrates these linkages.

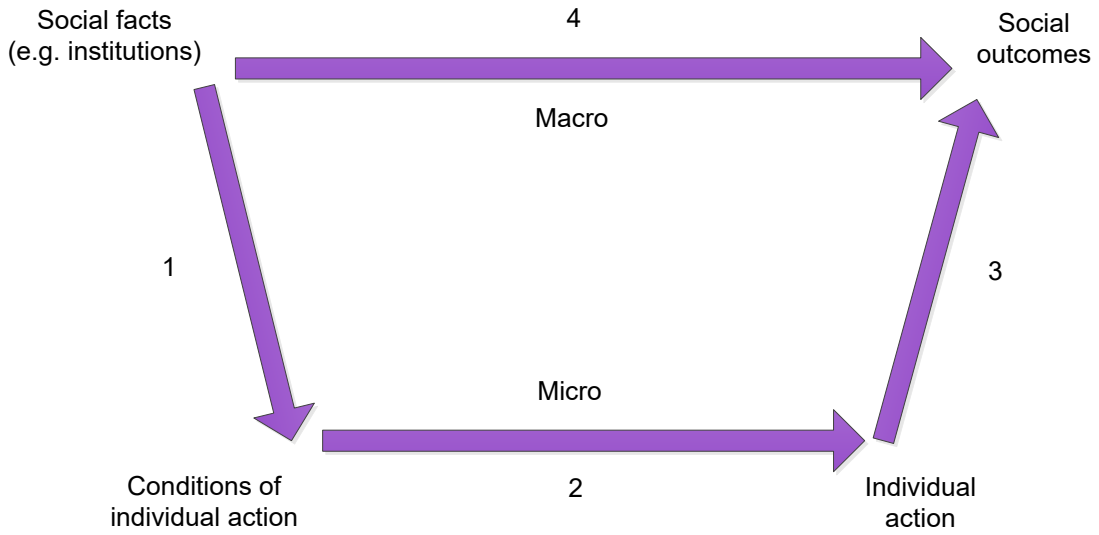

Figure 7. *Linkages between the macro- and the micro-levels (adapted from Coleman 1990 as cited in Foss 2009; Felin et al. 2015).*

The Figure 7 visualizes the differentiation between the macro- and the micro-levels. The macro can be understood as the organizational-level and the micro as the individual-level. The figure demonstrates four different arrows, which represent the linkages between the macro-macro (4), macro-micro (1), micro-micro (2) and last micro-macro (3). In a sense, the figure also shows what is to be explained (*explanandum*) and what is the explanation (*explanans*). Usually in social sciences the aim is to explain either the macro-level (upper right corner) phenomenon, such as firm level outcome or the link between the macro-phenomena (arrow 4). (Foss 2009, p. 15; Felin *et al*. 2015, p. 591) The figure is central for this research, since it depicts the overall purpose. This research aims to explore the individual-level in order to gain a more comprehensive understanding of the process innovation capabilities within the case organization. The majority of previous studies on the topic have usually been concentrated on utilizing the arrow 4, which concentrates merely on the macro-level.

To elaborate further, within strategy literature the microfoundational focus has been especially on attaching higher-level macro-concepts like dynamic capabilities, routines, and social capital on lower levels (e.g. Teece 2007; Foss 2009; Felin *et al.* 2012; Felin *et al.* 2015; Foss & Pedersen 2016). As mentioned, this perspective is strongly present in this research and it will be elaborated further in the next Section 2.1.2. Furthermore, Foss and Pedersen (2016) mention that typical questions are related to, for example, understanding dynamic capabilities in terms of managerial cognition, the motivational antecedents of human capital-based competitive advantage, how individual action and interaction constitute the capabilities that drive performance, and how routines emerge from such individual action and interaction. In addition, to be even more specific, Foss and Pedersen (2016) mention that recent years have concentrated on routines, firm-level performance, knowledge processes, absorptive capacity, ambidexterity, firm R&D, stakeholder management, problem formulation, innovation, dynamic capabilities, social capital, networks, the RBV, and organizational capabilities.

Methodological Individualism or Collectivism

Among others, Felin and colleagues (2012, p. 1352) mention that microfoundations are traditionally associated with "notions of 'reduction' or 'decomposition' in science and with 'methodological individualism' in the philosophy of social science". To enlarge, methodological individual-

ists insisted that aggregate concepts should be reduced to their constituent components, which are, for example, individuals and their interaction. In other words, microfoundations are entwined with the process of explaining a particular phenomenon in terms of more fundamental phenomena. It can also be called as the search for "deep structure" underneath the aggregate phenomena. However, there is a fundamental question about the location of the structure, since there may be multiple analytical levels below a given aggregate phenomenon. (Felin & Foss 2005; Foss 2009; Felin *et al.* 2012; Barney & Felin 2013; Felin *et al.* 2015; Foss & Pedersen 2016) These levels could be, for example, smaller organizations within an MNC or certain teams or individuals. The researcher of this thesis acknowledges the value of every level, but the emphasis will be on the individual-level. However, this study also discusses the linkages between the macro- and the micro-levels.

In order to advance the discussion, the question of whether social sciences should be based on methodological individualism or collectivism is one of the earliest controversies related to this subject. The same debate is still relevant regarding microfoundations, which includes, for example, microfoundations of strategy and organizational theory (Felin & Foss 2005; Foss 2009; Felin *et al.* 2012; Barney & Felin 2013; Winter 2013; Felin *et al.* 2015). A deeper look into the debate of methodological individualism versus methodological collectivism reveals the varying perspectives on the matter. Emile Durkheim (1962, p. 39, 106), who is also called as the father of social science, promoted a collectivist methodology and he argued that “social facts must be studied as things” as well as “individual natures are merely the indeterminate material that the social factor molds and transforms” (as cited in Barney & Felin 2013). This kind of view discharges individuals and human nature and argues that social sciences should focus on higher social and macro-factors such as culture and religion (e.g. Felin & Foss 2005; Foss 2009; Barney & Felin 2013; Winter 2013; Felin *et al.* 2015). To summarize the macro emphasis, it argues that the institutions, roles, rules, and structures of society are more important than individual-level considerations in perceiving society, market, and individual behavior (e.g. Felin & Foss 2005; Foss 2009; Barney & Felin 2013, p. 139; Winter 2013; Felin *et al*. 2015). This perspective, however, has been countered with an opposing view that promotes methodological individualism.

As methodological collectivism, also methodological individualism has been promoted by various scientists, such as Georg Simmel and Max Weber, for whom the individual was the fundamental element of social theories (Barney & Felin 2013). For these scholars, individual’s beliefs, preferences, and interests were a good foundation from which to build theories of how social structures emerge and evolve (Barney & Felin 2013). The fundamental notion is that in order to understand a collective phenomenon, we need to understand the elemental components: individuals and their social interaction (e.g. Felin & Foss 2005; Foss 2009; Barney & Felin 2013, p. 139; Winter 2013; Felin *et al*. 2015). Earlier, firm-level research has been central in helping us understand the origins of competitive advantage, but the next step is to decompose these aggregates in order to understand how organizational factors and advantages emerge (Felin & Foss 2005; Teece 2007; Foss 2009; Felin *et al.* 2012*;* Foss *et al*. 2012; Barney & Felin 2013; Felin *et al.* 2015; Foss & Pedersen 2016). However, when discussing microfoundations, it should be noted that they are not solely about individuals (e.g. Felin & Foss 2005; Foss 2009; Barney & Felin 2013; Felin *et al*. 2015).

Barney and Felin (2013), among others, argue that the problem with reducing everything to individuals is that it ignores the interactions among them as well as the context of the organization itself. Adding to this debate of methodological individualism and collectivism, Foss (2009, p. 20) mentions that one does not need to approve to “hardcore methodological individualism” to

accept that collective concepts in social science should have micro-foundations, that we lack mechanisms to directly link macro-variables, and that links between those variables should acknowledge the role of micro-variables such as individual actions and interactions (see also Felin & Foss 2005). In addition, Barney and Felin (2013, p. 141) mention that individual interactions are complex, and they can lead to unexpected aggregate and emergent outcomes. They also add, that those outcomes are hard to predict merely based on the knowledge of the interacting components. Barney and Felin (2013, p. 141) emphasize that reducing, or trying to reduce, everything to individuals is only "micro" – not "microfoundational". Therefore, considering additive and emergent outcomes, we can yet again state that microfoundations are not solely about individuals (e.g. Felin & Foss 2005; Foss 2009; Barney & Felin 2013; Felin *et al*. 2015). This research aims to emphasize the role of individuals without ignoring the interactions or the context of the organization itself.

Furthermore, from a strategical perspective, talent and mobility literatures are also somewhat proposing an additive perspective on organization (Barney & Felin 2013). Barney and Felin explain that this is because the performance of an organization can be relatively attributed to the talents of a particular person within the organization, especially, when there is little interdependence between people. However, the problem with organizational stars is that, since they can be perceived as freely available in the efficient market, they cannot be a source of sustainable competitive advantage (Barney & Felin 2013, p. 141). Although, we do know that individual talents are not irrelevant to the organizational performance. Grigoriou and Rothaermel (2014, p. 587) have found that the existence of relational stars results in firm-level knowledge advantages through both their own superior skills but also through their ability to transform others to be more effective at knowledge recombination. Relational stars can be perceived as potential sources of sustainable firm-level knowledge advantage, because they are firm-specific and their advantages are socially complex and causally ambiguous (Grigoriou & Rothaermel 2014, p. 587).

To summarize, so far, we have elaborated some key components of microfoundations related to the research agenda of this thesis. The key components include the fundamental idea that in order to understand a collective macro-level phenomenon, such as process innovation capabilities, we need to understand the elemental components: individuals and their social interaction. However, it should be noted that in this instance microfoundations are not solely about individuals, but also relevant instances of additive, aggregate, and emergent outcomes that arise from the interaction of people (e.g. Felin & Foss 2005; Foss 2009; Barney & Felin 2013; Felin *et al*. 2015). Thus, it can be recognized that a central question to consider is the relationship between micro- and macro-levels (Felin & Foss 2005; Foss 2009; Felin *et al.* 2012; Foss *et al.* 2012; Barney & Felin 2013; Felin *et al.* 2015; Foss & Pedersen 2016). To conclude, Barney and Felin (2013) mention that organizational analysis should be fundamentally concerned with how individual-level factors aggregate to the collective-level.

2.1.2 Microfoundations of Capabilities

Previously the terms routine and capability were introduced briefly, but what do they indicate and what is their relationship? As mentioned, routines are repeated and identifiable patterns of interdependent actions executed by multiple actors (Feldman & Pentland 2003, p. 95). An ordinary capability, on the other hand, is a higher-level routine or collection of routines (Winter 2003, p. 991). Furthermore, Winter (2003, p. 992) has established that capabilities are recognized to evolve in a hierarchy. According to the paper, ordinary capabilities are called as zero-level capabilities and they are recognized as underlying daily routine operations and other ca-

pabilities that are first order or even higher (see also Schoemaker, Heaton & Teece 2018). To explain further, capabilities that can change the product, production process, or the customers are not typically perceived as zero-level capabilities (Winter 2003; Schoemaker *et al*. 2018). For example, new product development is generally a first-order dynamic capability. However, it is important to note that the hierarchy is locally defined. This means that for a company with its own R&D department, producing and selling the product are zero-level capabilities, whereas for an independent R&D lab the new product development is a zero-level capability (Winter 2003, p. 992; Schoemaker *et al*. 2018). To conclude, the higher the order of the capabilities, the more likely they are defined as dynamic capabilities, which are acknowledged to operate on other capabilities (Winter 2003, p. 992; Schoemaker *et al.* 2018).

So, how do microfoundations relate to routines and capabilities? In fact, as briefly mentioned in the Section 2.1.1, the microfoundational perspective has already been applied to various macro-concepts such as routines, capabilities, dynamic capabilities, competitive advantage, organizational innovation, and absorptive capacity, to mention a few (Felin & Foss 2005; Teece 2007; Foss 2009; Felin *et al.* 2012; Foss *et al.* 2012; Barney & Felin 2013; Felin *et al.* 2015; Foss & Pedersen 2016). Yet, Foss (2009, p. 15) mentions that the capabilities view already incorporates lower-level explanations by trying to explain differential firm performance with heterogeneous routines and capabilities. However, this view as such acknowledges explanations only to a degree, since we cannot properly understand capabilities without the comprehension of individual actions and interactions that produce the capability (e.g. Felin & Foss 2005; Foss 2009, p. 15; Felin *et al.* 2012; Foss *et al.* 2012; Felin *et al.* 2015; Foss & Pedersen 2016). In addition, Coleman (1990, p. 3) argues that explanations that involve the micro-level have the features of being more constant, constitutional, and generic than mere macro-level explanations (as cited in Felin *et al.* 2012; see also Foss & Pedersen 2016).

Another argument adding to the importance of understanding microfoundations lies in the constitutional authorization of strategic management to enable managers to achieve and preserve competitive advantage (Teece 2007; Foss 2009, p. 15; Foss & Pedersen 2016). According to Foss (2009, p. 15) in order to achieve this, managerial intervention is required, which unavoidably must take place "with an eye" on the micro-level. A good example that demonstrates the importance of microfoundations is about changing culture. Collective culture and collective outcomes do not tell the manager what should be done to change the culture. Also, we cannot argue that managers can intervene directly on the level of, for example, capabilities. However, managers can influence capabilities, for example, by hiring key employees or by changing recruitment policies and rewards systems. Thus, the influencing happens at the micro-level. (Foss 2009, p. 15; Foss & Lindenberg 2013; Foss & Pedersen 2016) This can be said to be in the essence of the motivation of this research. Gaining understanding of the microfoundations for process innovation capabilities provides more understanding for managers to influence these capabilities desirably.

To summarize, for example, Felin and colleagues (2012, p. 1351) highlight the fact that despite the progress that has been made in understanding routines and capabilities, the underlying microfoundations have not received appropriate attention. Even though, there is a strong motivation for unlocking the mystery of what drives differences in the behavior and performance of firms. We do know, however, that microfoundations approach allows to deepen the understanding of the components underlying routines and capabilities and to explore how these components interact within or across categories to reveal how the differences arise and contribute to the heterogeneity of firms. (Felin & Foss 2005; Teece 2007; Foss 2009; Felin *et al.* 2012; Foss *et* al. 2012; Barney & Felin 2013; Foss & Lindenberg 2013; Felin *et al.* 2015; Foss & Pedersen

2016) To conclude, the aspects above act as a strong motivational factor for the microfoundational research agenda applied in this thesis.

Microfoundations of Ordinary or Operational Capabilities

Now that the fundamental microfoundational approach has been elaborated, it is appropriate to dig deeper into the microfoundational world of capabilities. Felin *et al.* (2012) have built on extant literature and line that different types of microfoundational categories include individuals, social processes and interactions, and structures. This is presented in the Figure 8 below. However, it should be kept in mind that the concepts of capabilities and dynamic capabilities are complex, developing, and debated. Thus, the question of what are the microfoundations of routines and capabilities is not well specified or straightforward to answer. Moreover, there is substantial variation in routines and capabilities, which may have explanatory consequences. For example, does explaining dynamic capabilities require the same microfoundations as explaining ordinary capabilities? In addition, microfoundations for routines and capabilities can indicate various conceptually different processes, for example, the emergence, maintenance, or reproduction, change, and displacement of routines and capabilities. Therefore, it is possible that the understanding of these various processes may also require different microfoundations. (Felin & Foss 2005; Foss 2009; Felin *et al.* 2012; Foss *et al.* 2012; Barney & Felin 2013; Felin *et al.* 2015; Foss & Pedersen 2016)

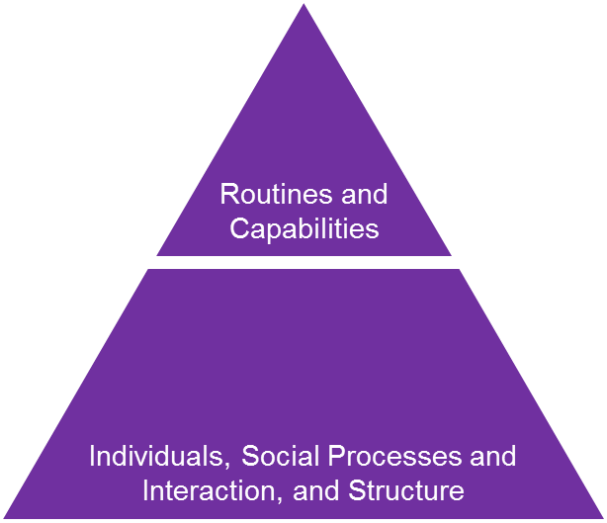

Figure 8. *Microfoundations of routines and capabilities (Felin et al. 2012).*

Felin *et al.* (2012, p. 1357) suggests that the categories presented in Figure 8 are embedded in an encapsulated and transitory, even causal, hierarchy. In addition, the categories are suggested to have main effects on routines and capabilities, and they are not seen as operating in a "vacuum". Rather, the categories are entangled in interactions within an organization. This indicates the interactions, for example, between individuals and between individuals and processes. Therefore, interactions within and among these categories form another collection of contributing effects related to the collective phenomena of routines and capabilities. (Felin *et al.* 2012, p. 1357) To note, studying micro-level phenomena benefits from aggregating microfoundational factors, but also from disaggregating routines and capabilities. In addition, organization or macro-level phenomena may be affected by the surrounding context, or macro social structure. (Felin & Foss 2005; Foss 2009; Felin *et al.* 2012; Foss *et al.* 2012; Barney & Felin 2013; Felin *et al.* 2015)

Since the concepts of the categories presented in the Figure 8 are slightly vague, the next Figures 9 and 10 aim to summarize some main features of the categories. The figures are collected and formulated from Felin *et al.* (2012).

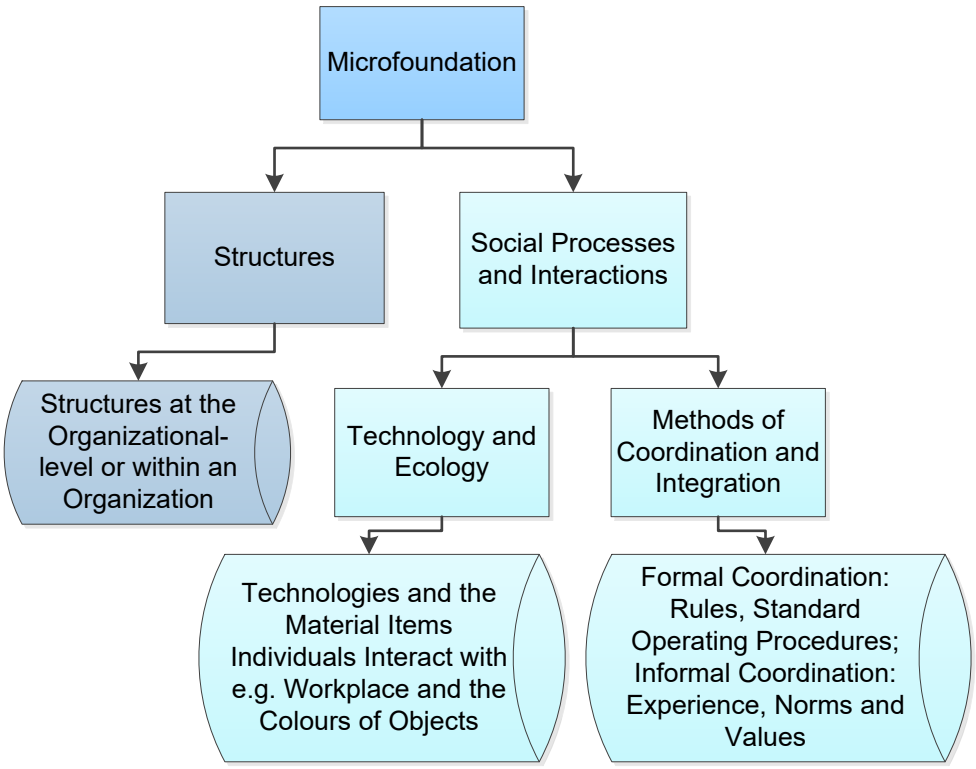

Figure 9. *Structures and social processes and interactions as microfoundations (Felin et al. 2012).*

To elaborate, the Figure 9 presents the microfoundational categorization of structures and social processes and interactions for routines and capabilities (Felin *et al.* 2012). The figure is designed so that the main themes are easily available, and, in addition, examples of each category are given. For example, technology and ecology as well as methods of coordination and integration are demonstrated as important factors for the microfoundational category of social processes and interaction. Furthermore, specific examples of these subcategories are presented beneath the particular subcategory.

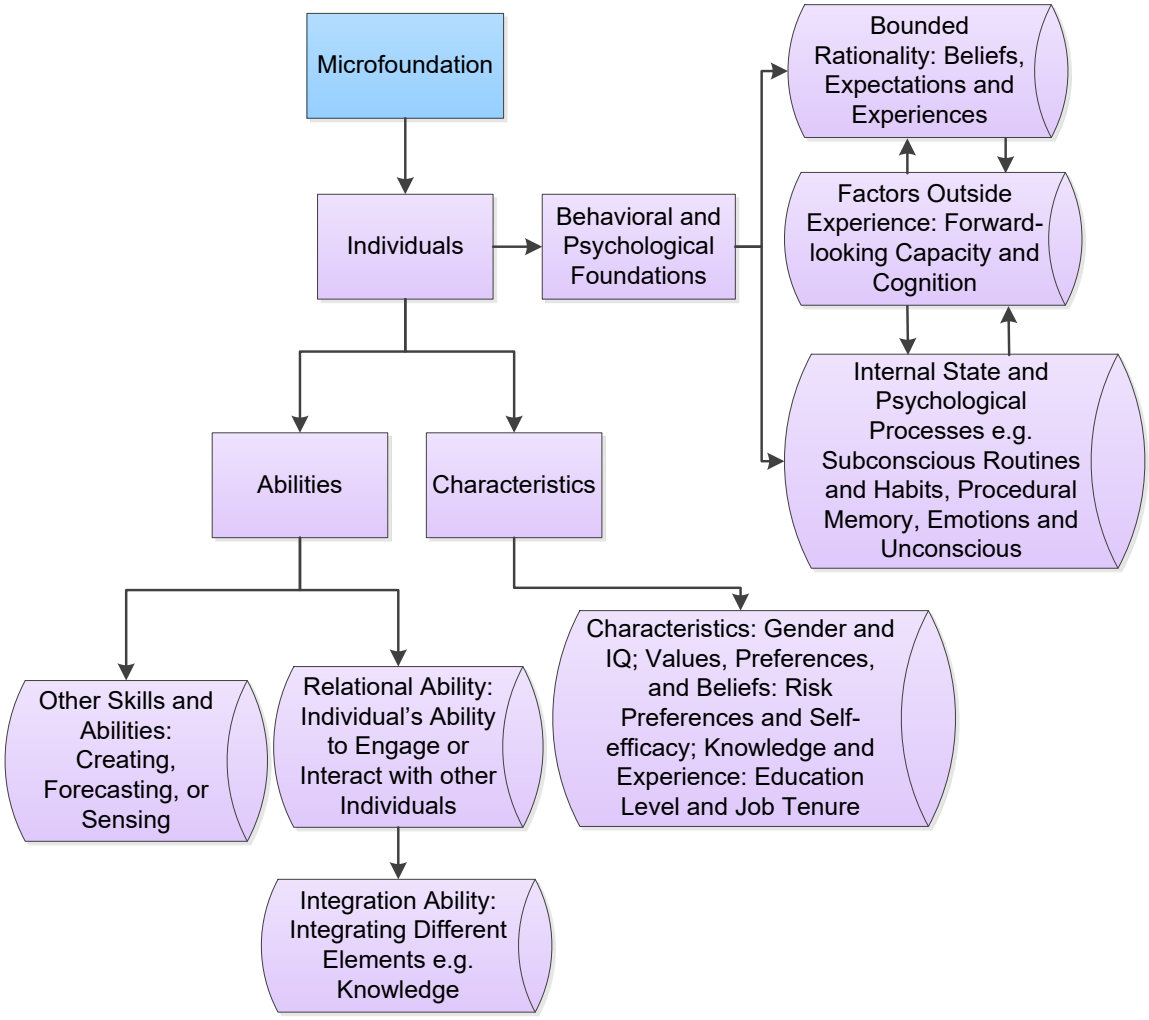

Figure 10. *Individuals as microfoundations (Felin et al. 2012).*

The Figure 10, on the other hand, presents the category of individuals (Felin *et al.* 2012). The figure is designed so that the main themes are easily available, and, in addition, examples of each subcategory are presented. For example, abilities, characteristics, and behavioral and psychological foundations are demonstrated as important factors for this specific microfoundational category. Furthermore, specific examples of these subcategories are presented beneath the specific subcategory. It should be noted, that the examples on behavioral and psychological foundations are entwined and linked to one another. To summarize, together the Figures 9 and 10 present the microfoundational categorization for routines and capabilities Next, the extant theory of dynamic capabilities and the related microfoundational categories will be elaborated in more detail.

Dynamic Capabilities

Dynamic capabilities determine the speed and degree to which the firm's distinct resources can be aligned and realigned to match the requirements and opportunities of the business environment (Teece & Pisano 1994; Teece *et al.* 1997; Teece 2007, 2012, p. 1395, 2014; Teece & Leih 2016; Schoemaker *et al.* 2018). In other words, dynamic capabilities enable firms to identify advantageous configurations of competencies and assets, construct and orchestrate them, and then exploit and utilize them with an innovative and agile organization (e.g. Schoemaker *et al.* 2018, p. 17). In addition to these definitions, Teece (2007, p. 1319) has elaborated the composi-

tion of dynamic capabilities further. The first layer comprises of the following capabilities: sensing, seizing, and reconfiguring. The first capability category, sensing new opportunities, includes activities like scanning, creation, learning, and interpretive activity. It requires, for example, investments in research, probing of customer needs, and various technical possibilities. The search activities related to the capability sensing include, for example, information about the developments in the business ecosystems. (Teece 2007, 2012, 2014; Teece & Leih 2016; Schoemaker *et al.* 2018) To summarize, the enterprise will need sensing, seizing, and reconfiguring capabilities to be simultaneously both developed and applied in order to build and maintain competitive advantage (Teece 2007, p. 1341, 2012, 2014; Teece & Leih 2016; Schoemaker *et al.* 2018).

The second capability, seizing, is related to the aftermath of discovering new technological or market opportunities. The new discovery must be addressed through new products, processes, or services, which usually leads to an investment in development and commercialization. Addressing the discovered opportunities involves maintaining and improving technological competencies and complementary assets and seizing the opportunity via, for example, investment at the right time. (Teece 2007, 2012, 2014; Teece & Leih 2016; Schoemaker *et al.* 2018) However, Teece (e.g. 2007, p. 1327) highlights that it is not uncommon that companies fail to invest. He also mentions that in some cases incumbent enterprises tend to avoid radical competency-destroying innovation in favor of more incremental competency-enhancing improvements.

Moreover, in worst cases, this kind of risk aversion tendency can freeze the possible development opportunities that are available for the incumbent firm to be seized. The third and last capability category is reconfiguration or transforming. This category relates to the stages that follow the sensing and seizing capabilities. For example, the successful identification of technological opportunity and the following selection of suitable technology and the commitment to financial resources can lead to enterprise growth and profitability. However, this, in turn, will lead to the augmentation of enterprise-level resources and assets. A key to sustained profitable growth is the ability to recombine and to reconfigure assets and organizational structures to accompany the growth of the enterprise. (Teece 2007, p. 1355, 2012, 2014) Thus, in other words, reconfiguring requires organizational agility.

In addition, the dynamic capabilities literature emphasizes the role and influence of management. The framework acknowledges that an enterprise is shaped but not automatically trapped by its past. The agency of management can generate major source for differences via, for example, investment choice and other decisions. Enterprises are even said to be able to shape their own ecosystems. Furthermore, sensing, seizing, and reconfiguring are recognized as the key strategic functions of executives. (Teece 2007, p. 1341, 2012, 2014) Furthermore, Teece (2012, p. 1395) emphasizes that unlike ordinary capabilities, certain dynamic capabilities can be formulated on the skills and knowledge of one or a few executives rather than on organizational routines.

From the microfoundational point of view, this statement highlights both the individual and the managerial effects. Important management and top management -level activities are semi-continuous asset orchestration and corporate renewal. Also, top management leadership skills are required to sustain dynamic capabilities. The strong emphasis is on entrepreneurial skills and management. (Teece 2007, p. 1335, 2012, 2014; Teece & Leih 2016) To conclude, dynamic capabilities serve as a connector between the present and future (Schoemaker *et al.* 2018, p. 18).

Microfoundations of Dynamic Capabilities

Now that the fundamental dynamic capabilities approach has been elaborated in more detail, it is appropriate to dig deeper into the microfoundational world from this perspective. The Figure 11 presents the dynamic capabilities framework decomposed and integrated with microfoundational approach.

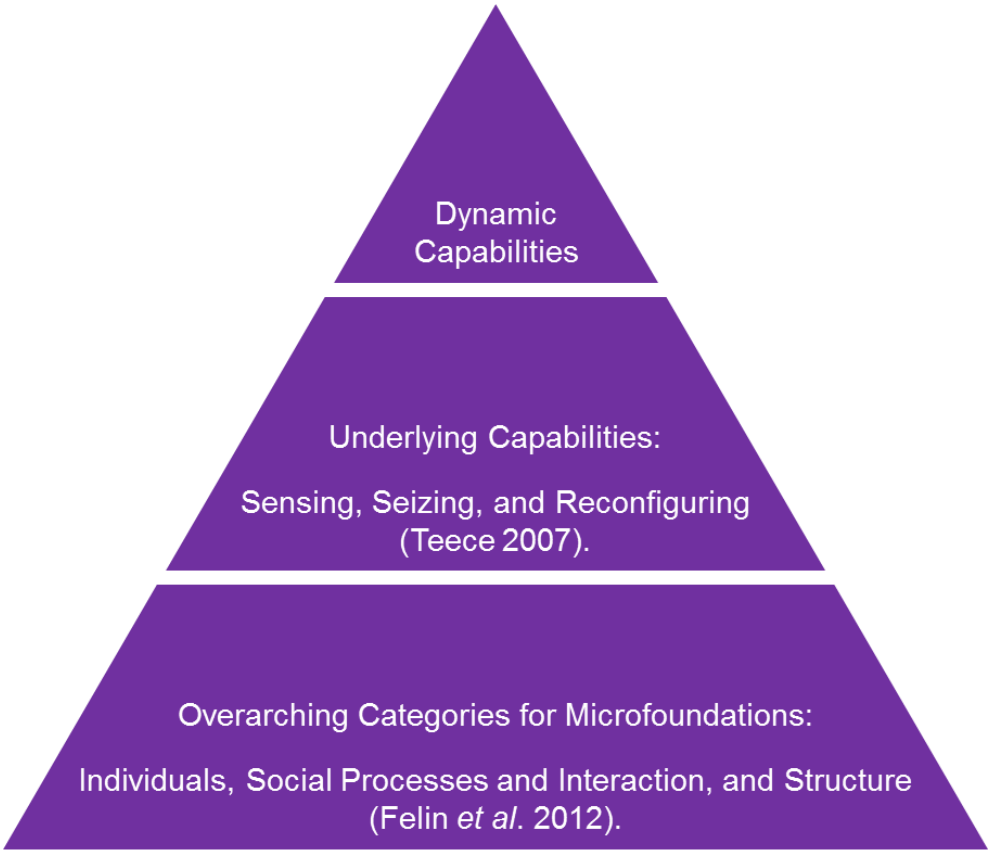

Figure 11. *Dynamic capabilities framework decomposed (Teece & Pisano 1994; Teece et al. 1997; Teece 2007; Felin et al. 2012).*

So far, in the context of dynamic capabilities, we have discussed the first two layers of the Figure 11. Next, we will elaborate on the last layer. Teece and Pisano (1994) and Teece and colleagues (1997) have proposed three organizational and managerial processes: coordination or integrating, learning, and reconfiguring, and suggested that these are the core elements of dynamic capabilities. These processes can be said to be the subset of the processes that support sensing, seizing, and reconfiguring. Together they form the asset orchestration processes. (Teece 2007, p. 1341) Moreover, Teece (2007, p. 1319) explicates the microfoundations of dynamic capabilities as "distinct skills, processes, procedures, organizational structures, decision rules, and disciplines".

However, the Figure 11 presents the last layer according to the classification of categories by Felin *et al.* (2012). This categorization can be conceptualized as simultaneously representing the above-mentioned microfoundations of distinct skills, processes, procedures, organizational structures, decision rules, and disciplines as suggested by Teece (2007). These microfoundations can be recognized as belonging to the microfoundational categories. The subcategories were discussed in more detail earlier in the Figure 9 and 10. In order to gain a more practical overview of the subject, the Table 2 demonstrates some examples of microfoundations of dynamic capabilities according to Teece's classification.

Table 2. *Examples of microfoundations of dynamic capabilities according to Teece's classification (adapted from Mousavi, Bossink & Van Vliet 2018)*

Capabilities	Microfoundations
Sensing	➢ Identifying and/or creating new opportunities. ➢ Internal R&D and exploring technological opportunities. ➢ Gaining knowledge about customer needs, competitors, probing markets, and listening to suppliers.
Seizing	➢ Exploiting the sensed opportunities or threats by implementing and commercializing new products, processes, or services. ➢ Selecting product architectures, that is, the design and performance specification of products. ➢ Selecting or creating a specific business model defining its strategy, investment priorities, and related incentives. ➢ Selecting organizational boundaries to manage complementary resources.
Reconfiguring	➢ Activities to continuously align and realign tangible and intangible resources and competencies to maintain the evolutionary fitness. ➢ Managing co-specialization of one asset to another, or of strategy to structure, or of strategy to process. ➢ Decentralization and restructuring the company to improve decision making and coordination ➢ Learning and integrating know-how from outside as well as within the enterprise particularly as "systems" and "networks" are present.

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2.2 Innovation

It is widely accepted in the extant literature that creativity and innovation are critical success factors for organizations (Peng *et al.* 2013; Anderson *et al.* 2014). Therefore, it is not surprising that a growing interest to acquire more holistic understanding of the building blocks of innovation related capabilities exists. However, the task is not straightforward, since creativity and innovation are complex, multilevel, and emergent phenomena that require skillful leadership to forge results (Anderson *et al.* 2014, p. 1298). However, despite the complex and debated nature of innovation, the field is extremely fascinating. Before continuing, some key definitions related to innovation are presented. According to OECD Oslo Manual (2018, p. 20) the key components of innovation include the role of knowledge as a basis for innovation, novelty, and utility, and value creation or protection as the assumed goal of innovation. In addition, the OECD Oslo Manual suggests that the implementation requirement differentiates innovation from other concepts such as invention. In other words, innovation comes to life after it has been put into use or made available for others through implementation (OECD Oslo Manual 2018, p. 20). To summarize, novel ideas are generated from existing or new knowledge or combinations of knowledge, and at the time of implementation these ideas metamorphose into useful innovations.

However, in addition to the fundamental definition, the term innovation has several layers. OECD (2018, p. 20) elaborates that the term *innovation* itself can represent both an *activity* and the *outcome* of an activity. Anderson *et al*. (2014, p. 1298) have added to the discussion that creativity and innovation are the process, outcomes, and products of efforts to develop and introduce new and improved ways of operating. Anderson and colleagues also define the creativity phase as the idea generation, whereas innovation refers more on the following phase of implementing these ideas in order to achieve better procedures, practices, or products. In addition, they mention that creativity and innovation can occur either at the level of individual, team, organization, or combination of these levels (Anderson *et al.* 2014). Furthermore, the notion of innovation also incorporates the concept of subjectivity and this adds to the complexity of the terminology (Van Der Van 1986; OECD 2018). To conclude, all the above-mentioned terms are used in the innovation literature.

2.2.1 Process Innovation

In order to gain a better understanding of the focus of this research, the term *process innovation* is elaborated further. Whereas product innovations are defined as new products or services introduced to meet an external need, process innovations are usually defined as new elements introduced into a firm's production or service operation to produce a product or render a service (Utterback & Abernathy 1975 as cited in Damanpour 2010; Damanpour & Gopalakrishnan 2001). To add, Hervas-Oliver *et al.* (2014) state that process innovations are generally based on cost reduction or the improvement of flexibility in production. The next Figure 12 will illustrate the different types of process innovations (OECD Oslo Manual 2018).

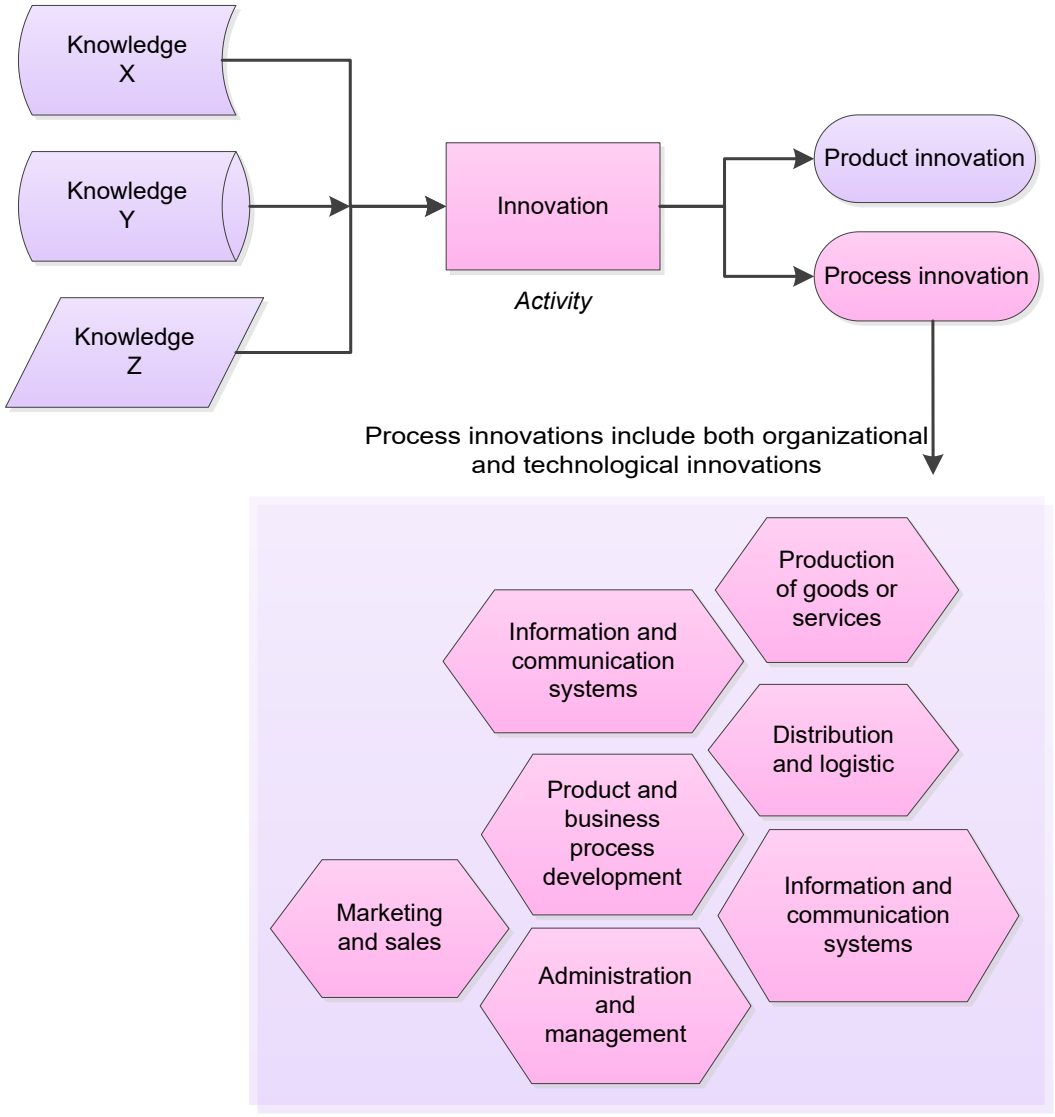

Figure 12. *Illustration of different types of process innovations (OECD Oslo Manual 2018).*

The Figure 12 aims to provide an overview of the different kinds of process innovations that are within the definition of OECD Oslo Manual (2018). In addition, the figure demonstrates how knowledge as an input is transformed through an innovation activity, or process, into a product or a process innovation. The different functional perspectives on process innovation are demonstrated under the block of process innovation. Additionally, in this case, the term process innovation, includes both organizational and technological innovations. However, the above figure does not include the typology which determines the impact or said scope of innovation. By this the author means that innovations can be placed on a continuum from continuous improvements to incremental innovations and radical innovations. To summarize, the Figure 12 depicts the definition of process innovation related to the focus of this research.

Why concentrate on process innovations? Process innovations are a relevant and fascinating theme and there is a gap to be fulfilled in the literature. The knowledge of process innovations and particularly the question of how firms become process innovators is still underdeveloped (Keupp *et al.* 2012; Piening & Salge 2015; Marzi *et al.* 2017). This perspective is included in this research by focusing on microfoundations of, exactly, process innovation capabilities. Studying microfoundations will grant the opportunity to understand how the process innovation capabili-

ties emerge, and what are the underlying factors, which contribute to the process innovation success. In addition, Keupp *et al.* (2012) have emphasized that particularly critical gap in the literature resides in the lack of insight into the organizational and managerial activities through which firms introduce process innovations.

Furthermore, studies regarding the pharmaceutical industry have mainly focused on product innovation or the discovery and development of new drugs, rather than process innovations that are generally more related to changes in the manufacturing processes (Lugovoi *et al.* 2018). However, on behalf of the value of process innovation speaks its role in supporting product innovation and overall operational performance of, for example, the production process (De Figueiredo & Kyle 2006; Ballot *et al.* 2015). In addition, it should be acknowledged that manufacturing is a far greater cost driver for the pharmaceutical industry than is generally acknowledged (Price 2013, 2014).

Previously, Piening and Salge (2015) have made the connection between process innovations and dynamic capabilities. In their research they have highlighted the antecedents, contingencies, and performance consequences of differences in process innovation success, for example, in introducing new production, supply chain, or administrative processes. Their findings suggest that firms can increase the possibility of achieving process innovation success and consequent financial performance improvements by engaging in broad range of different innovation activities. In addition, they mention that even though their dynamic capabilities approach adopted a firm-level perspective, the role of human agency is an important factor in this line of research. (Piening & Salge 2015) This adds to the relevancy of this research's individual-level microfoundational approach on process innovation capabilities.

2.2.2 Continuous Innovation

Even though the focus of this study is on process innovations, the terms continuous improvement and continuous innovation are highly related and will be explained next. Audretsch, Martínez-Fuentes and Pardo-del-Val (2011, p. 1921) mention that employees contribute to the process of continuous innovation by participating in continuous improvement (CI) programmes such as individual suggestion systems or working teams. Research into innovation has resulted in a new broader perspective of its nature, since most innovations are not drastic or radical (Audretsch *et al.* 2011). Therefore, according to some scholars, incremental improvements can also be considered as innovations (Toivonen & Tuominen 2009). This is also the approach present in this thesis.

Furthermore, CI-programmes are considered as a specific case for incremental innovation (Bessant & Caffyn 1997; Audretsch *et al.* 2011). To further, Bessant and Caffyn (1997) have elaborated that their definition of continuous improvement builds upon the idea of high involvement innovation. Thus, they see CI as an organization-wide process of focused and sustained incremental innovation. It is obvious that organizations need to increase their innovative capacity and capabilities, and one way for achieving this is to extend participation to a wider population (Bessant & Caffyn 1997). To summarize, continuous innovation can be interpreted as a continuous flow of incremental improvements or innovations accompanied by high involvement of employees.

In addition, CI implies the participation of lower-level company personnel (Audretsch *et al.* 2011). As an integral part of the success of an organization is the ability to foster, develop, and use the innovative potential of their shop-floor employees (Oldham & Cummings 1996; Axtell *et*

al. 2000). Despite the importance of fostering innovation among shop-floor employees is increasingly recognized, there is little empirical research done on the topic. To clarify, there have been studies on creativity, but very few on shop-floor employees specifically. Work psychology studies have been more focused on creativity and the generation of ideas rather than their implementation. (Axtell *et al.* 2000)

This side of the topic is also relevant for this thesis, since the internally crowdsourced innovation management tool incorporates and facilitates innovation also at the shop-floor. Because the software connects all the employees within the case organization, it also connects the shop-floor employees and their knowledge and ideas straight to, for example, the top management. Furthermore, Axtell and colleagues (2000) have found in their study that the suggestion of ideas was more related to individual characteristics than the group or organizational characteristics. In addition, they found that, on the other hand, the implementation of ideas was more strongly predicted by group and organizational characteristics. To conclude, Bessant and Caffyn (1997) mention that CI should be interpreted as a journey instead of a destination, since it is a long-term learning process.

2.2.3 Process Innovation Capabilities

The dynamic capabilities theory has advanced the understanding of innovation, since it has directed attention to the process of future resource creation, concentrating especially on how to create new resources and renew existing ones, to adapt to the changes in the environment (Teece *et al.* 1997; Fallon-Byrne *et al.* 2017, p. 21). As mentioned earlier, more importantly, previous literature has suggested that dynamic capabilities framework holds premise for advancing knowledge of process innovation (Piening & Salge 2015, p. 81; Marzi *et al.* 2017). Thus, approaching process innovations from the viewpoint of capabilities is applicable. From the dynamic capabilities' lens, the activities focused on generating, acquiring, integrating, and disseminating knowledge form the firm's fundamental ability to develop and implement process innovations (e.g. Teece 2007; Piening & Salge 2015). The dynamic capabilities theory also suggests that rather than studying R&D or other innovation activities like external knowledge sourcing in isolation, an integrative perspective on bundles of activities is mandatory to attain synergistic effects (Teece *et al.* 1997; Peng, Schroeder & Shah 2008; Piening & Salge 2015).

To point out, the research field of capabilities has remained surprisingly uninterested about process innovations (Woiceshyn & Daellenbach, 2005), even though process renewal or innovation is by definition the fundamental function of dynamic capabilities (Zollo & Winter 2002; Piening & Salge 2015). Process innovations could be perceived as a lens to analyze the broader phenomenon of organizational capability building, which includes how firms create, implement, and replicate new operating routines (Pisano 1994; Piening & Salge 2015). In addition, Crossan and Apaydin (2010) call for multilevel research that examines the relationship among variables that exist at different levels, such as, individual, group, or organizational levels. This is where the microfoundational approach comes in as convenient way to approach the problem. The approach was demonstrated in the Figure 7 in the Section 2.1.1. Furthermore, Piening and Salge (2015) mention that an example of an approach for studying process innovation could include how individuals' skills, attitudes, and behaviors shape the execution and performance effects of firms' innovation-related activities. Thus, the microfoundational approach of this thesis is appropriate for studying the antecedents of process innovation capabilities and the relationship of human agency.

In order to explain the following initial framework for bridging innovations and capabilities, some concepts will be recapped briefly. To note, the boundaries between different level capabilities are not set in stone yet. However, various scholars do agree that there are different levels for capabilities (e.g. Winter 2003; Teece 2007; Felin *et al.* 2012; Schoemaker *et al.* 2018). Winter (2003) has suggested that an ordinary capability is a high-level routine or collection of routines. Moreover, routines can act as inputs to capabilities and, in addition, routines can also be capabilities themselves (e.g. Felin *et al.* 2012). Dynamic capability, on the other hand, can be acknowledged as even higher-level capability that builds on, for example, other capabilities and resources (Winter 2003; Teece 2007; Felin *et al* 2012). However, even though routines and capabilities are linked, they are also different constructs. Firstly, they are different manifestations and focus on different phenomena and they both need more explanation. This could be done, for example, by identifying the phenomena underlying routines and capabilities and distinguishing how these contribute to routines and capabilities. (e.g. Felin *et al.* 2012, p. 1356) To summarize, some scholars suggest that it makes logical sense to refer to a hierarchy with N, potentially larger than 2, layers of capabilities (e.g. Winter 2003; Felin *et al.* 2012; Felin *et al.* 2015).

In addition to the above recap, different terms for the different layers of capabilities were already briefly discussed in the section 2.1.2. Zero-level capabilities are the capabilities that refer to the daily routine operations, also called as ordinary or operational capabilities (Winter 2003; Teece 2014; Schoemaker *et al.* 2018). First order, or higher, are referred as dynamic capabilities (Teece *et al*. 1997; Winter 2003, p. 992; Schoemaker *et al.* 2018). However, it should be kept in mind that this typology is not explicit. Now that we have recapped the concept of the hierarchy of capabilities, how do these different level capabilities link with different level innovations? This question will be answered next.

Schoemaker and colleagues (2018; see also Teece 2007, 2012, 2014; Teece & Leih 2016) suggests that the three capability clusters of dynamic capabilities: sensing, seizing, and reconfiguring, entail the collective skills that organizations require when pursuing, for example, disruptive innovation, radically new business models, and strategic leadership. Moreover, they state that the deeper challenge is to move beyond reactive or incremental innovation towards more radical direction, and that reactive and incremental innovation will develop the capabilities that are compatible with current operations and orientations. This is not necessarily enough, thus, there is a need for new, out of the ordinary, operations (Schoemaker *et al.* 2018).

Following what has been discussed and integrating the information with the aim of this thesis, it is possible to distinguish different types of process innovation capabilities. These are, for example, incremental process innovation capability and radical process innovation capability. The latter being more of a dynamic capability and the former more of an ordinary capability. To summarize, Schoemaker *et al*. (2018) mention that firms can sustain and extend competitive advantage by layering the more strategic dynamic capabilities on top ordinary capabilities. To conclude, this discussion has been an introduction for connecting the concept of capabilities with different scopes of innovations demonstrated next.

Innovation Capabilities Framework

Innovation is another highly complex phenomenon. However, the concept of innovation radicalness could support connecting innovation with different levels of capabilities. Firstly, innovations can be classified according to the degrees of change they make in the adopting organization (Damanpour 1991). Re-oriental, nonroutine, and ultimate innovations are radical innovations, which produce fundamental changes in the activities of an organization and represent clear separation from existing operations. Incremental innovations result in small separation from existing operations. (Dewar and Dutton 1986; Hage 1980 as cited in Damanpour 1991) To summarize, incremental innovations can be suggested to be connected to lower-level capabilities, which are more focused on building on top of the daily operations than resulting in radical change.

Radical innovations, on the other hand, are more closely linked with dynamic capabilities. This is not explicitly demonstrated in the extant literature, but Schoemaker *et al* (2018, p. 16) do imply that incremental innovations will, at best, develop capabilities that are congruent with current operations. This integrational suggestion has value when trying to understand the underlying microfoundations of process innovation capabilities, because this distinguishes incremental process innovation capability from its counterpart radical process innovation capability. To note, even though, different level capabilities are said to partially build on each other, they could also have different underlying microfoundations (e.g. Felin *et al.* 2012). The researcher has visualized the relationship between innovation and capabilities in the Figure 13.

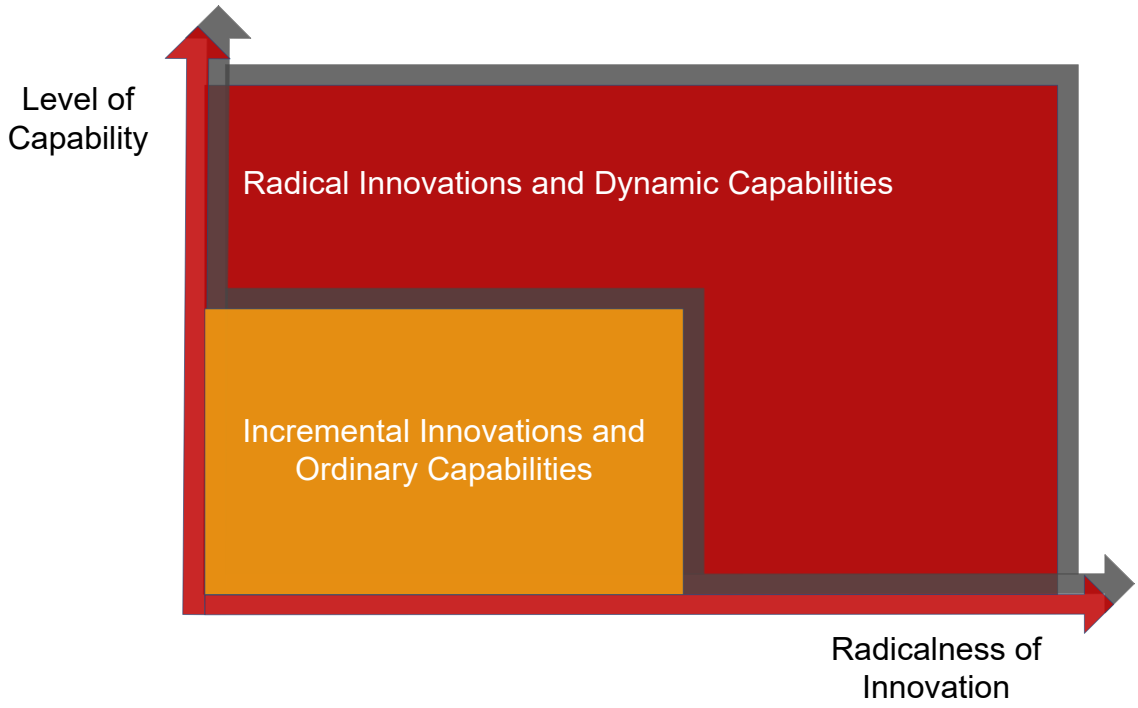

Figure 13. *The researcher's visualization of the relationship between innovation radicalness and the level of capability.*

The basic idea behind the visualization in the Figure 13 is highly simplified, yet important. The boxes with different types of innovations and capabilities are not unambiguous, but rather give direction to the clarification of the suggestion. When the radicalness of innovation grows, so does the required level of capability. It is appropriate to acknowledge both the level of capability and the radicalness of innovation being continuums instead of explicit definitions. Following the

discussion in the overall Chapter 2, the terms incremental process innovation capability, as an ordinary or operational capability, and radical process innovation capability, as a dynamic capability, seem appropriate.

Furthermore, Schoemaker and colleagues (2018, p. 17) add that ordinary capabilities enable identification of important process innovations, whereas dynamic capabilities help identify new products or services and potentially opening new markets. In addition, dynamic capabilities also administer how ordinary operational capabilities, like incremental process innovation capability, should be combined and re-orchestrated inside the firm and which capabilities need to be added or saved (Schoemaker *et al* 2018, p. 18). The next figure 14 integrates the conceptualization of the Figure 13 and adds further conceptualization in the form of continuous improvement and innovation.

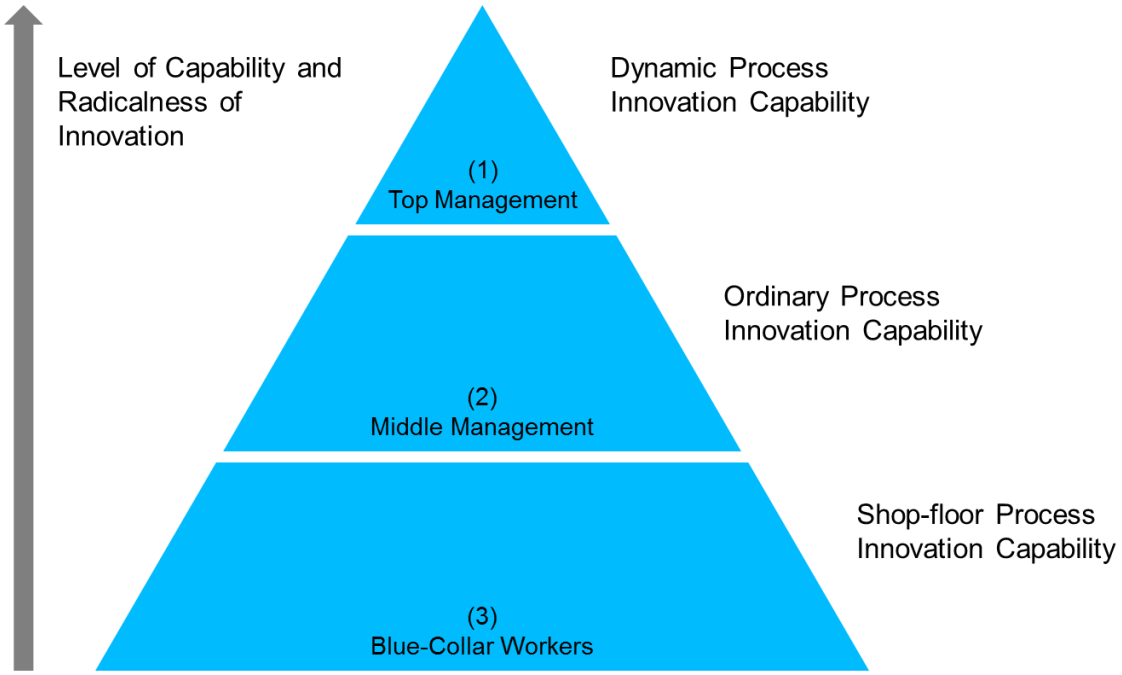

Figure 14. *A possible hierarchy of process innovation capabilities.*

The content of the Figure 14 integrates both the dynamic capabilities framework and sources of innovation literature. In addition, it is another way to illustrate and build forward what was demonstrated in the Figure 13. The figure presents a framework for understanding the conceptualized evolution of process innovation capabilities. To be more precise, the Figure 14 entails how the different process innovation capabilities could evolve in a hierarchy. This hierarchy builds up from lower-level routines and competences related to the daily operations. Usually blue-collar workers are the interface, for example, for repetitive daily manufacturing operations. Generally, the most incremental innovations and continuous improvements happen at this level. The second level incorporates, for example, bundles of incremental process innovations and how to manage the process innovations and improvements happening at the lower level.

Furthermore, managerial support has been acknowledged more important for incremental innovations, since the type of innovations are often introduced by middle or lower levels of the organization (Damanpour 1991, p. 581). Thus, the ordinary process innovation capability evolves on top of the shop-floor process innovation capability. One example of this kind of ordinary process innovation capability could be, for example, managing continuous innovation. The third level is the dynamic process innovation capability, which concentrates more on radical process innovations and managing the lower level capabilities in the form of, for example, overall inno-

vation strategy. However, as has been discussed before, these constructs are not fixed. The figure merely identifies a possible hierarchy. Next, the framework is discussed from the CI point of view presented in the Table 3.

Table 3. *The evolution of CI capability in stages (adapted from Bessant & Caffyn 1997).*

Term	Definitions and References
(1) Natural or background CI	Problem-solving random No formal efforts or structure Occasional bursts punctuated by inactivity and non-participation Dominant mode of problem-solving is by specialists Short-term benefits No strategic impact
(2) Structured CI	Formal attempts to create and sustain CI Use of a formal problem-solving process Use of participation Training in basic CI tools Structured idea management system Recognition system Often parallel system to operations
(3) Goal oriented CI	All of the above, plus formal deployment of strategic goals Monitoring and measurement of CI against these goals In-line system
(4) Proactive or empowered CI	All of the above, plus responsibility for mechanisms, timing, etc., devolved to problem-solving unit High levels of experimentation
(5) Full CI capability – The Learning Organization	CI as the dominant way of life Automatic capture and sharing of knowledge Everyone actively involved in innovation process Incremental and radical innovation

The Table 3 summarizes the evolutionary stages of CI capability according to Bessant and Caffyn (1997). To conceptualize, the *background CI* can be identified as a lower-level routine or capability and *full CI capability* as an example of a dynamic capability. The Figure 14 conceptualizes a possible hierarchy of process innovation capabilities. If the Table 3 were to be integrated with the Figure 14, some of the lower-level capabilities of CI could be interpreted, for example, as microfoundations or parallel and integrated capabilities for the different levels of process innovation capabilities. For example, the full CI capability, in other words the learning organization, could be an integrated microfoundational or parallel building block for dynamic process innovation capability. The degree of integration could be conceptualized to depend on the level of capabilities. Also, Bessant and Francis (1999) have linked certain evolutionary levels of CI with dynamic capabilities. To add, the potential for involving employees directly at strategical or higher levels has not been adequately exploited, partially due to lack of sufficient tools (Tonnessen 2005, p. 196). Thus, there can be recognized to be unused potential that could be used, for example, for building process innovation capabilities.

Microfoundations of Innovation Capabilities

Now that the initial conceptual framework for different process innovation capabilities have been demonstrated, it is appropriate to dive, once again, deeper into the microfoundational world. It is not satisfactory to only discover that capabilities such as knowledge management or organizational learning contribute to innovative capabilities. However, as the explained microfoundational approach has established, if these capabilities were disaggregated into their microfoundations, it would grant a much more fundamental view on the subject and, thus, be more relevant for managerial intervention, too (e.g. Foss 2009, p. 15; Foss & Pedersen 2016). Furthermore, Foss (2009, p. 20) has acknowledged that micro-level knowledge-related behaviors, such as knowledge sharing and integration, serve as microfoundations for innovation related capabilities. Yet, according to him, these are usually “blackboxed” in the capabilities first approach. This, in turn, does not aid in identifying the managerial interventions, which could serve to create or change capabilities (Foss 2009, p. 20). The Figure 15 offers visualization of the microfoundations of dynamic capabilities for innovation (Fallon-Byrne & Harney 2017, p. 26).

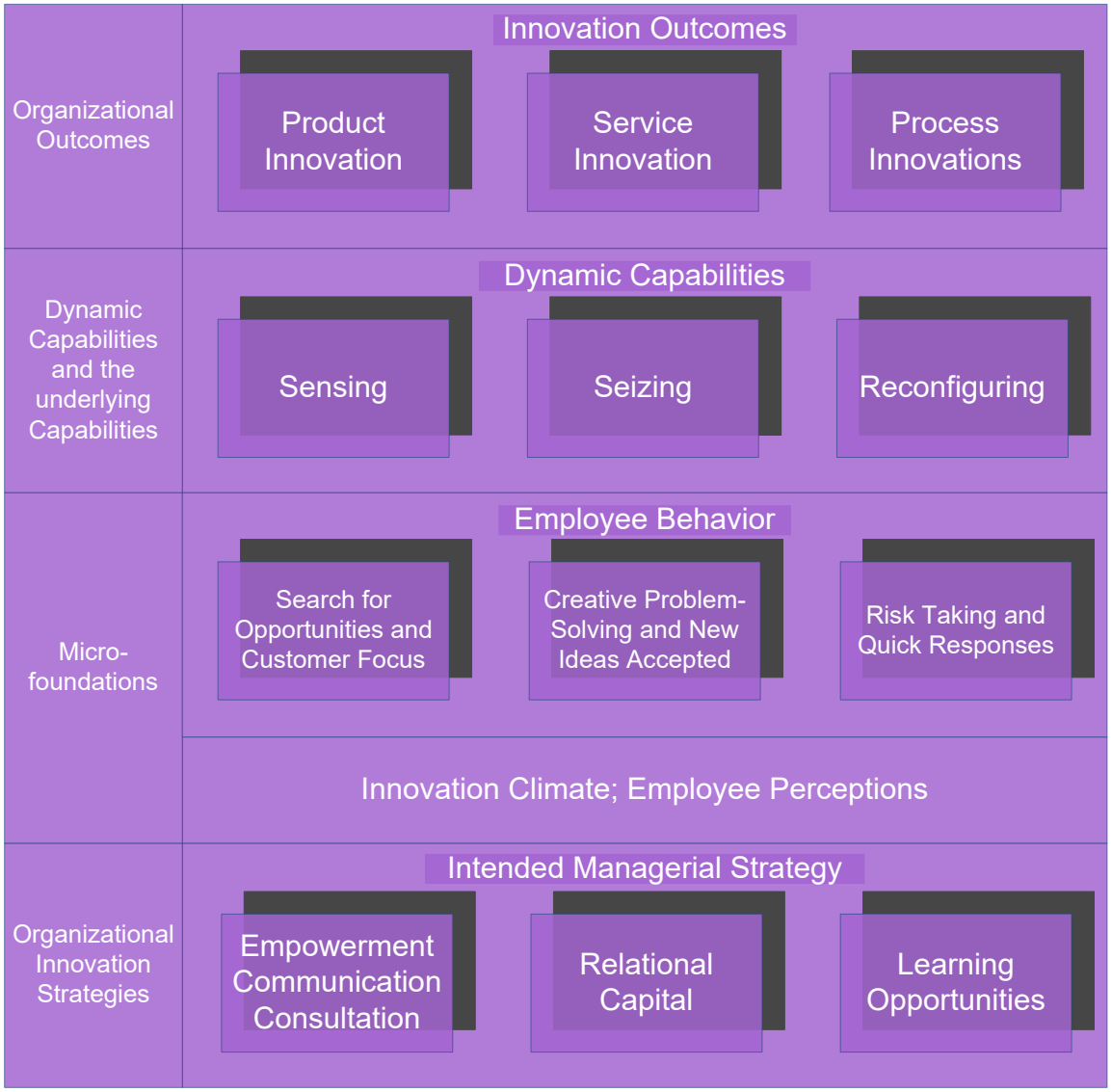

Figure 15. *One illustrative example of microfoundations of dynamic capabilities for innovation (adapted from Fallon-Byrne & Harney 2017, p. 26).*

The Figure 15 provides a way to integrate the individual and organizational -level processes which contribute to explaining dynamic capabilities for innovation. To emphasize, in the Figure 15 the innovation capabilities are treated and analyzed as dynamic capabilities only. The aim of the demonstration was to provide a glance, which shows an example of the microfoundations of dynamic capabilities for innovation.

2.3 Individual and Contextual Factors of Innovation

This subchapter highlights some interesting and relevant topics within the scope of individual and contextual factors that influence organizational innovation. As mentioned previously, employee innovation emerges from the interaction of personal and contextual factors, such as individual characteristics, intrinsic job factors, group factors, relationships at work, and organizational factors, which either encourage or inhibit employee's innovation related activities (Janssen 2005). Amabile (1997) and Anderson and colleagues (2014) have also contributed to this topic. They suggest that work environments have an impact on creativity by affecting components that contribute to creativity, which represents the fundamental source for organizational

innovation. These components are expertise, creative-thinking skill, and intrinsic motivation. Additional contextual components are organizational motivation to innovate, resources, such as finances, time and personnel, and managerial practices such as enabling challenging work and supervisory encouragement. (Oldham & Cummings 1996; Amabile 1997; Anderson *et al.* 2014) To outline, there are various individual and contextual factors contributing to employee innovation and the complexity increases when analyzing the interactional factors that emerge from the combinations of these factors.

2.3.1 Innovative Work Behavior

The Section 2.2.2 of Continuous Innovation emphasizes the role of shop-floor employees in relation to the concepts of continuous improvement, incremental innovation, and continuous innovation. The innovative work behavior (IWB), on the other hand, relates strongly to the same context but provides a more holistic and deeper perspective on the behavior of individuals overall. Moreover, Janssen (2000) has introduced a definition for innovative work behavior that is originally based on West and Farr (1989) and West (1989). Based on the definition, IWB consists of the deliberate creation, introduction, and implementation of new ideas. This type of behavior can take place within a work role, group, or organization and the aim is to benefit role performance, the group, or the organization. In addition, IWB is recognized to include different behavioral tasks, which are idea generation, idea promotion, and idea realization. (Janssen 2000, p. 288)

However, in order to properly understand the process of innovation, it is crucial to understand the factors that facilitate and inhibit the development of innovations. These factors include, for example, ideas, people, transactions, and context over time. An interesting point of view emphasizes that an innovative idea without an advocate gets nowhere. This highlights that human agency is crucial, since people are the ones to develop, carry, react to, and modify ideas. However, this is just one example underlining that already, since more than 20 years ago, it was obvious that human agency is a central construct for successful innovation. (Van De Ven 1986, p. 591–592) To summarize, there is a growing interest to investigate cognitive and motivational processes underlying individual innovative behavior at the individual-level (e.g. Amabile *et al.* 1996; Janssen 2000). The empirical findings related to this topic will be elaborated in the Subchapter 4.4.

The reason why IWB is engaged by employees lies in motivational factors. Sometimes these motivational factors are also perceived as profits to be gained by the individual. The profits available from innovation can include both better functioning of the organization and social-psychological benefits for individual workers or groups of individuals. Examples of these profits are more appropriate fit between perceived job demands and workers' resources, increased job satisfaction, and better interpersonal communication. (Janssen 2000, p. 288) The topic of motivational factors is important for the overall subject of this thesis, since individuals are acknowledged as one of the most important microfoundational categories underneath the different level capabilities. Therefore, individuals and their motivational factors can be recognized as important pieces of the puzzle, when trying to solve how capabilities emerge and how they can be influenced. This kind of motivational perspective is usually more focused on the internal processes of an individual. However, as proposed earlier, also social processes and interactions can be recognized as a source for microfoundations (Felin *et al.* 2012).

The whole sequence of needed actions and interactions to implement innovations are highly complex in various ways. Innovators are said to be attempting to break the institutionalized sys-

tem of theories and practices and, therefore, this sociopolitical process can be expected to be resisted by organizational members, who are committed to the general established ways. Due to the resistance, it is crucial for the innovator to acquire friends, backers, and sponsors. (Janssen 2005) Thus, for a generated idea to be implemented it needs various abilities from the innovator and, also, from the interactions that happen within the organization in different phases of the innovation process. The idea generation is more related to the abilities and characteristics of an individual. However, the idea promotion phase requires a different set of abilities to be successful. This phase is also more interactionists and, thus, other people can inhibit or encourage the innovation process dependent on various possible factors, for example, personal relationships with the innovator.

Furthermore, as briefly discussed earlier, the interactionist perspective of this research indicates that employee innovation emerges from the interaction of personal and contextual factors. These factors are recognized to either encourage or inhibit employee's innovation related activities. (Janssen 2005) So, in addition to the individual and the interactions among individuals, the contextual factors are identified as important in determining the overall innovation related behavior. To note, there has been initiatives to explore the determinants that influence employee IWB, but despite the advances the results are still limited. (Černe *et al*. 2014; Shalley and Zhou 2008 as cited in Maqbool *et al.* 2018) It should also be noted, that the interplay between contextual and relational factors, as well as the macro social structure of the organization, might have considerable effects on the microfoundations of collective-level phenomena (Felin & Foss 2005; Foss 2009; Felin *et al.* 2012, p. 1358; Foss *et al.* 2012; Barney & Felin 2013; Felin *et al.* 2015). Therefore, this research has an integrative approach, which highlights the individual factors without discarding the contextual factors and their interplay. The aim is to build all the way from individuals and their interactions to the emergence of process innovation capabilities on different levels as presented in the Figure 14 in the section 2.2.3.

2.3.2 Knowledge Creation Context

To elaborate further on the meaning of context, Nonaka *et al.* (2000, p. 13) mention that knowledge needs a context to be created in. Nonaka and colleagues emphasize that the context-specificity relates to who participates and how they participate. Furthermore, Amabile *et al.* (1996, p. 1155) mention that social environment can influence both the level and the frequency of creative behavior. In addition, among various other papers, Felin and colleagues (2012, p. 1358 see also Felin & Foss 2005; Foss 2009; Foss *et* al. 2012; Barney & Felin 2013; Felin *et al.* 2015) have stated that organizational or collective-level phenomena may be affected by the context or macro social structure of the organization. However, some of the more traditional psychological approaches to creativity have been extra focused on specific characteristics of a creative person (Barron 1955; MacKinnon 1965 as cited in Amabile *et al.* 1996). Yet, as mentioned previously, this research examines both the individual and contextual factors that emerge as influencing factors during the interviews. The decision is based on, in addition to what was said above, on the fact that developmental psychology acknowledges that the development of a person is reliant both on nature and nurture, where nature represents the biology, and nurture the environment of development (Siegler, DeLoache & Eisenberg 2014). Regarding the context, the levels of interest are both the organizational environment and the macro-environment. These environments might influence the individuals and their behavior and, therefore, process innovation capabilities, too.

Next, the discussion shifts to a model of shared context for knowledge. This shared context for knowledge is also called as "ba". More specifically, ba refers to a shared context in which

knowledge is shared, created, and utilized. In fact, knowledge creation is never free from context. According to the model, in knowledge creation the generation and regeneration of ba is the key to success, since ba is said to provide the energy, quality, and the place to carry out the individual conversion and knowledge integration. Since social, cultural, and even historical contexts are valuable for individuals, the context provides the fundamentals for one to interpret knowledge and to generate meanings. Furthermore, the concept of ba is not a mere place, but it incorporates both space and time. For example, virtual spaces can also function as ba. Altogether, ba should be understood as interaction. To conclude, knowledge is created via interactions among individuals or between individuals and their environments. (Nonaka *et al.* 2000, p. 13–15) The Figures 16 and 17 demonstrate some aspects of the model.

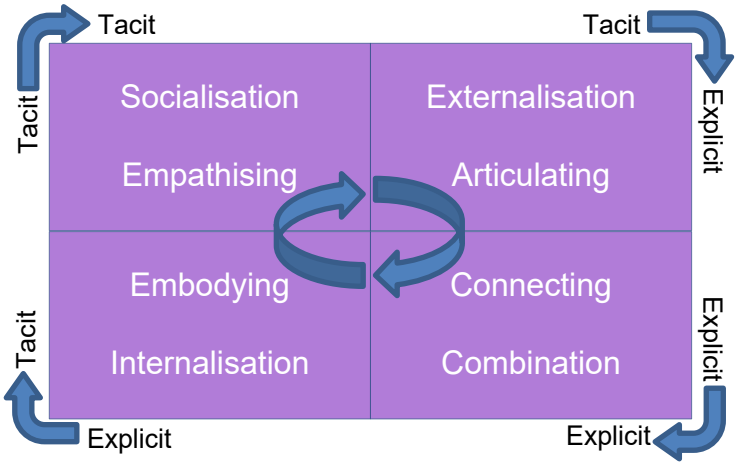

Figure 16. *The SECI process (adapted from Nonaka et al. 2000, p. 12).*

The Figure 16 demonstrates the four modes of the knowledge conversion process SECI. First, the process of socialization is converting new tacit knowledge through shared experiences. Second, the process of eternalization is articulating tacit knowledge into explicit knowledge. For example, new product development and improvements made in the shop-floor can be categorized into externalization. Third, the process of combination is converting explicit knowledge into more complex and systematic bundles of explicit knowledge. Fourth, the process of internalization embodies explicit knowledge into tacit knowledge. In other words, internalization can be closely linked to "learning by doing". Moreover, when knowledge is internalized and it becomes a part of the individuals' tacit knowledge base, it becomes a valuable asset. To conclude, accumulated individual-level tacit knowledge can then ignite new knowledge creation when combined with others via socialization. (Nonaka *et al.* 2000, p. 9–11)

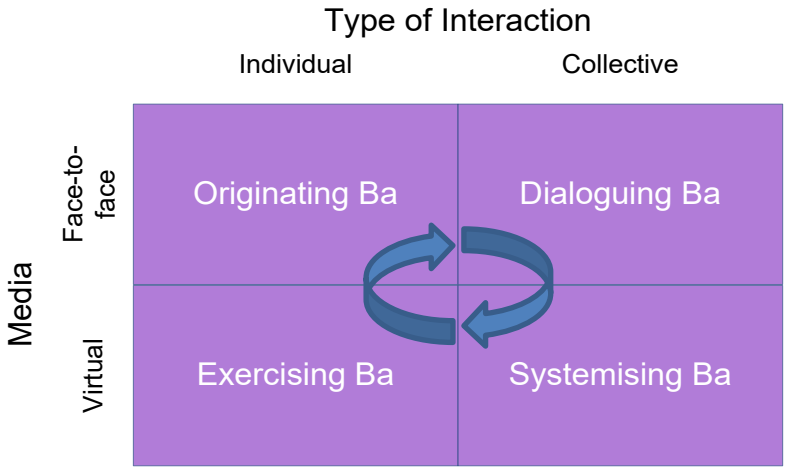

Figure 17. *A model of context for knowledge creation, sharing, and utilization (adapted from Nonaka et al. 2000, p. 16).*

As demonstrated in the Figure 17, four types of ba exist. These are originating ba, dialoguing ba, sytemising ba, and exercising ba, which are all defined by types of interactions and the media of interactions. Virtual media refers to, for example, books, manuals, memos, e-mails, and teleconferences. It should be noted that building, maintaining, and utilizing ba is important when aiming to facilitate organizational knowledge creation. (Nonaka *et al.* 2000, p. 16) Firstly, originating ba is characterized by individuals and face-to-face interactions. In more detail, it is referred as a place where individuals share experiences, feelings, emotions, and mental models. This ba highlights socialization, since this kind of interaction is the only way to capture the overall range of physical senses and psycho-emotional reactions. From this particular ba emerge care, love, trust, and commitment, which are said to form the fundamentals for knowledge conversion among individuals. Dialoguing ba, on the other hand, is the collective and more constructed version of the formerly mentioned ba. Systemising ba is collective and virtual and it offers a context for the combination of existing explicit knowledge virtually. Virtual collaborative environment can be listed as an example. To conclude, exercising ba comprises of individual and virtual interactions and mainly offers a context for internalization. (Nonaka *et al.* 2000)

2.3.3 Motivation, Resources, and Management

According to the componential model of creativity and innovation in organizations (Amabile 1988), three broad organizational factors have been proposed: organizational motivation for innovation, resources, and management practices (as cited in Amabile *et al.* 1996, p. 1156). The model is demonstrated in the figure 18 below. Organizational motivation is the fundamental orientation and support for innovation within the organization. Resources, in this instance, refer to everything that the organization has available for innovation related activities. Management practices, on the other hand, refer to freedom or autonomy within work tasks, challenging and interesting work, specification of clear strategic goals, and formation of work teams by selecting individuals with broad set of skills and perspectives. (Amabile *et al.* 1996, p. 1156) To summarize, the figure 18 presents a model of organizational factors, deemed as necessary, for creativity and innovation.

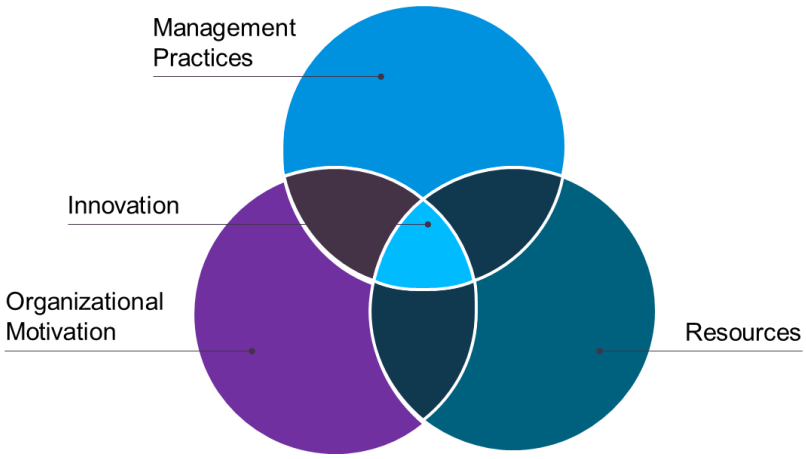

Figure 18. *Organizational factors for creativity and innovation (Amabile 1997).*

In addition, the theory predicts that elements of the work environment will impact individuals' creativity. The identified components related to individuals' creativity are presented in the Figure 19 below. Moreover, the influence of these environmental factors on task motivation has appeared to be the most immediate and direct. (Amabile 1997, p. 52) In addition to task motivation, the other components are expertise and creativity skills. To advance the organizational factors, organizational motivation can be summarized as the basic orientation of the organization toward innovation, in addition, with supporting creativity and innovation throughout the organization. Top management is seen as the level from where the primary support should origin, but naturally also other levels of management can contribute by communicating and interpreting that vision. In addition, the primary organizational supporting factors for innovation seem to be mechanisms for developing new ideas: open, active communication of information and ideas, rewards and recognition for creative work; and fair evaluation of work even in cases of failures. (Amabile 1997, p. 52)

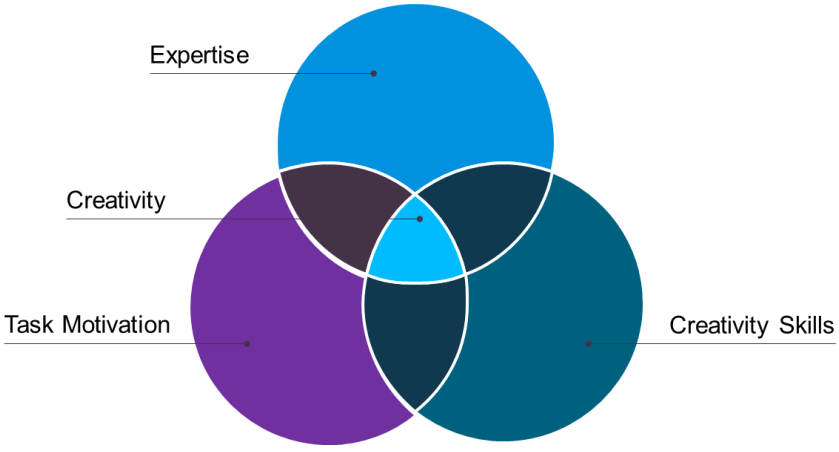

Figure 19. *Three component model of creativity (Amabile 1997).*

To elaborate the creativity components further, the model suggests that creativity is most likely to arise when person's skills overlap with their strongest intrinsic interests, such as their deepest passions. In addition, the model indicates that the higher the components the higher the creativity. Expertise is said to be the infrastructure for all the work that needs creativity. The expertise component combines memory for factual knowledge, technical proficiency, and special talents subjective to the organization. Creative thinking, on the other hand, is suggested to provide the magical "something extra". This can be interpreted as cognitive style favorable for taking new perspectives on problems, an application of methods for the exploration of new cognitive pathways, and working style conductive to persistent energetic pursuit of one's work tasks.

In addition, creative thinking depends on personality characteristics. These characteristics are interdependence, self-discipline, orientation toward risk-taking, tolerance for ambiguity, preservice through frustration, and a relative lack of concern for social approval. (Amabile 1997, p. 41–42) The mentioned personality characteristics summarize what a person is capable of, but these characteristics need to be integrated with motivation in order to forge results.

Motivation

Task motivation is the factor, which will determine whether a person will eventually show innovative work behavior. Motivation is usually described as two faced. This refers to intrinsic and extrinsic motivation types. Intrinsic motivation is driven by interest and involvement in the work, curiosity, enjoyment, or a personal sense of challenge. Extrinsic motivation, on the other hand, is driven by the desire to attain a goal that is apart from the work itself, for example, achieving a reward, meeting a deadline, or winning a competition. Despite the existence of primarily two types of motivation, the combinations of these are also common. (Amabile 1997, p. 42)

Furthermore, research has revealed that extrinsic motivators operate as supports for creativity. Examples of these motivators can be rewards and recognition for creative ideas, clearly defined goals for work, and frequent constructive feedback on the work. However various researches indicate that intrinsic motivation has more influence on creativity. Another interesting remark highlights that to some extent a high degree of intrinsic motivation can even compensate for a deficiency in creativity skills or expertise. (Amabile 1997, p. 42) To conclude, the intrinsic motivation principle suggests that intrinsic motivation is conductive to creativity. However, controlling extrinsic motivation is detrimental to creativity, but informal or enabling extrinsic motivation can be conductive particularly if initial levels of intrinsic motivation are high. (Amabile 1997, p. 46)

Management Practices and Resources

The component of management practices for creativity and innovation presented by Amabile (1997) incorporates management at all levels. Previous studies have highlighted, for example, challenging work, work group supports, supervisory encouragement, and freedom (Amabile 1996). Moreover, Janssen (2005) has underlined that perceived supervisory support of employee innovation encourages employees to participate in innovative activities. In addition, some studies have also demonstrated the importance of assigning the right people to the right assignments, based on skills and interest. This can maximize the positive challenge feeling for the individual. Another aspect underlines the importance of clear goals. In addition, clear feedback, good communication, and enthusiastic support were also seen as important factors to foster the desired creativity. (Amabile 1997, p. 53–54)

In addition to appropriate management practices, resources are crucial in fostering organizational innovation. The resources component of the model presented in the Figure 18 incorporates all that the organization has available for innovation related activities. Resources can include, for example, sufficient time for producing innovative work, people with the right expertise, financials allocated for innovation activities, material resources, systems and processes in order to work, relevant information, and the availability of training. (Amabile 1997, p. 53–54) To conclude, the Figure 20 provides a systematic model of the impacts of individual, group, and organizational factors on organizational creativity (Woodman *et al.* 1993, p. 309).

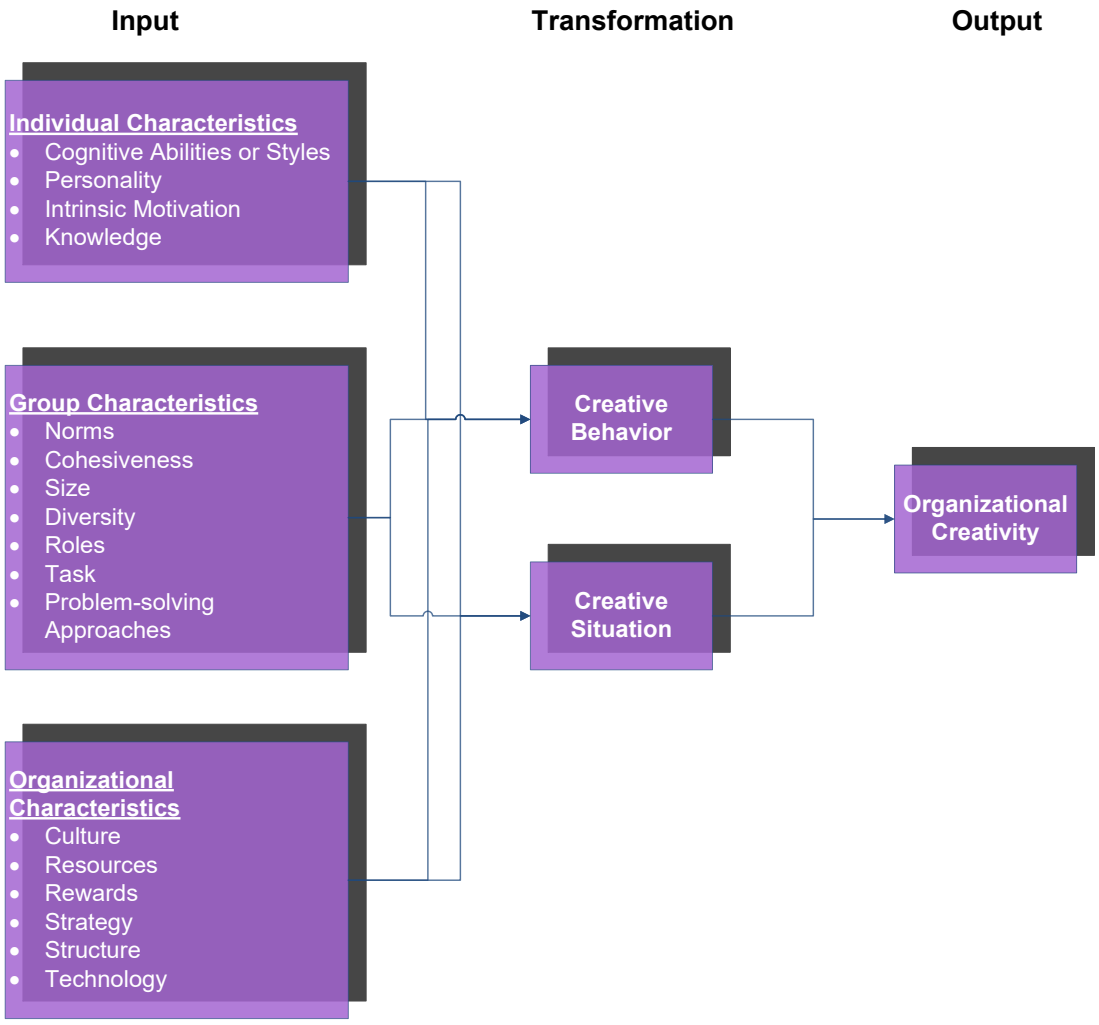

Figure 20. *Systematic model of the impacts of individual, group, and organizational factors on organizational creativity (adapted from Woodman et al. 1993, p. 309)*

2.3.4 Organizational Culture and Climate

Culture's relationship with innovation has gathered increasing attention in business and management in recent years, because the influence has been recognized as a critical success factor for innovation. However, theorizing and research on this subject have lagged behind the practical needs and, moreover, the extant literature is fragmented and disconnected (Anderson *et al.* 2014; Tian *et al.* 2018). In order to begin the discussion of organizational culture, the concept should be defined. However, the task of defining the concept of culture is not straightforward. In fact, the concept has been discussed and debated by anthropologists and sociologists for a long time (Tian *et al.* 2018).

House *et al.* (2002) have defined that culture can be recognized as a set of parameters of collectives, which are related to "patterned ways of thinking, feeling, and reacting that constitute the distinctive way of life of a group of people" (Kluckhohn, 1951, p. 86 as cited in Tian *et al.* 2018). However, due to the complexity, there is no generally agreed definition. Overall, Bik (2010, p. 72) recognizes culture as something that distinguishes one group from another based on a certain set of values, beliefs, behaviors, and attitudes. In addition, the concept of culture is acknowledged as shared, interpreted, and transmitted over time within a collective, which

makes the collective unique and even distinguishes that collective from other collectives. (Bik 2010, p. 72). It should be noted that individuals are affected by both the national and the organizational culture (Tian *et al.* 2018). However, this thesis is more interested in the organizational culture and, thus, the concept of national culture will not be elaborated further.

Furthermore, Baer and Frese (2003) have identified that the relationship between process innovativeness and firm performance was enhanced by high levels of climate for personal initiative and psychological safety. This statement awakens a question of how the concept of climate relates and differ from culture. Culture can be perceived as a deeper and less consciously held set of meanings than what is usually perceived as organizational climate (Reichers & Schneider 1990, p. 24 as cited in Baer & Frese 2003). However, organizational climate is another complex phenomenon to define. James (1982) and James, Joyce, and Slocum (1988) conceptualized organizational climate as an aggregated psychological climate. According to them, one way to explain psychological climate is to refer it to a "set of perceptions that reflect how work environments, including organizational attributes, are cognitively appraised and represented in terms of their meaning to and significance for individuals" (James *et al.* 1988, p. 129). Altogether, both the organizational culture and climate are highly important in building process innovation capabilities, since culture and climate influence the individual-level.

Innovation-oriented culture

More specifically innovation-oriented culture can be defined as a combination of organizational cultural values, norms, and artifacts which support innovativeness within a company (Stock, Six & Zacharias. 2013). Bessant, Birkinshaw, and Delbridge (2004) state that creating a more innovative culture is about building an environment that supports individuals in their innovative endeavors. They also mention that various larger companies have been able to kill the entrepreneurial spirit of their employees. This has happened through a combination of short-term thinking, risk aversion, and top-down decision making. On the other hand, they also mention that one way to start fostering innovative culture is a systematic innovation programme. This links back to previously discussed CI-programmes and high involvement continuous innovation in the Section 2.2.2. Furthermore, building innovation-oriented culture is ultimately about changing the way people act and think daily. This, in the end, is driven by a complex set of stimuli, such as rewards, incentive schemes, and trust and support provided by senior managers. To conclude, innovative cultures are fragile. They can take years to build but are destroyed very fast. (Bessant *et al.* 2004, p. 35)

2.3.5 Digitization of Innovation

In today's world, organizations operate in an environment that is increasingly penetrated by digital technology. The various technologies are embedded in the core of products, services, and operations. (Yoo *et al.* 2012) According to the Oslo Manual (2018, p. 38), digitalization involves the utilization of digital technologies to a wide range of existing tasks and enables new tasks to be performed. Furthermore, digitalization as a phenomenon has the potential of transforming business processes, the economy, and society in general (Oslo Manual 2018, p. 38). Therefore, it can be acknowledged to have transforming effects on how we perceive innovations, too.

In the new era of digitalization, some fundamental questions have emerged. The questions that have emerged are definitional boundaries for innovation, agency for innovation, and the relationship between innovation processes and outcomes (Nambisan *et al.* 2017, p. 223). To clarify,

digital innovation can be used to describe two things. It can be perceived as the use of digital technology during the innovation process or as the outcome of innovation. The effect of digitalization has led scholars to doubt the explanatory power and usefulness of extant innovation theory and related organizational scholarship. (Benner & Tushman 2015; Nambisan *et al.* 2017, p. 223) Thus, there is a critical need for novel theorizing on digital innovation management (Nambisan *et al.* 2017, p. 223).

Svahn, Mathiassen and Lindgren (2017) have identified four different competing concerns incumbent firms face when embracing digital innovation: capability, focus, collaboration, and governance. First, the innovation capabilities concern expresses that while incumbent firms develop new capabilities, they need to be careful not to jeopardize their existing innovation practices. This might be recognized as causing tension between the development-oriented employees and those whose capabilities have become core rigidities. This can lead to competency traps, which inhibit effective responses to digital options. Second, firms need to find a balance between developing new design and management processes and leveraging digital technology in products and services. Third, firms should simultaneously encourage both their internal employees and engage with external partners and resources. Finally, firms should develop such managerial practices and systems that recognize creativity and differentiation at the expense of current authority structures and integration arrangements. In addition, managers should negotiate a balance between regulation and flexibility to allow exploration of digital options. (Svahn *et al.* 2017, p. 239–240)

Furthermore, the transition from innovation to digital innovation has been acknowledged as an opportunity to be seized by information systems researchers (Nambisan *et al.* 2017, p. 224). Prior information systems research has highlighted the important role of information technology (IT) for innovation in firms. In addition, the extant innovation literature has recognized that accessing and integrating external knowledge, such as customers, competitors, universities, or consultants, is vital to firms' innovative success. Open innovation is progressively embraced by firms to exchange ideas, knowledge, and technologies with external actors throughout the innovation process. (Benner & Tushman 2015; Trantopoulos *et al.* 2017, p. 287–288) Trantopoulos and colleagues (2017, p. 295) suggest that top management of manufacturing firms should expect that investing in communication platforms that allow employees to connect and exchange ideas online and offline should enhance the productive use of externally sourced knowledge for process innovation. In addition, the authors have identified that those manufacturing firms, which aim to enhance process innovation performance, should search deeply from various external knowledge sources. However, this puts high demands on the ability to absorb that knowledge within the organization. Network connectivity can be acknowledged to support these activities, too. (Trantopoulos *et al.* 2017) To summarize, IT can be recognized as turning innovation digital (Yoo *et al.* 2012).

Previous research has emphasized the digitization of innovation processes and outcomes especially regarding the impact of IT on new product development (NPD). Huesig and Endres (2019) have explored the influencing factors on the adoption of particular software tools, which support innovation management. These software tools are called innovation management software (IMS), which represents a specific sub-field of computer-aided innovation (CAI). (Huesig & Endres 2019, p. 302–303) Moreover, also total innovation management and employee suggestion systems and their relation to the field of CAI have been discussed (Chen, Shao & Tang 2009). These kinds of tools allow engaging the entire workforce to participate in improvement programs (Huesig & Enders 2019, p. 304). In the case organization of this thesis, the internally crowdsources innovation management software also integrates employee suggestion system

and various idea management features. Thus, the implemented IMS software allows the engagement of the entire workforce and much more. For example, according to Nambisan (2003), IT supports collaboration, coordination, and communication among team members and enhances the base of knowledge available to the team.

To conclude, digitalization has all-embracing effects on innovation, which results in a critical need for novel theorizing on digital innovation management (Nambisan *et al.* 2017, p. 223). In addition, the research area for the effects of digital tools for innovation is at its infancy. The presented research of the impacts of IT by Huesig and Enders (2019) also focuses merely on the NPD. This theme is relevant for this thesis, since the second supporting research question aims to explore the effects of innovation management software on individual's innovative behavior. Integrated to the broader context of this thesis, the focus will be on the exploration of the influence of IMS tools on the microfoundations of process innovation capabilities, for example, in the form of individual behavior. To the author's knowledge, this is yet an unexplored field.

3. RESEARCH DESIGN

This chapter explains the design of this research. In general, the research design represents the plan how the researcher aims to answer the established research questions. First, the chapter presents the research methods selected for this study and justifies the decisions in this master's thesis. Second, the chapter describes the overall research process in more detail. Third, the chapter demonstrates the data collection including the interviewee selection. Finally, this chapter discusses how the data analysis was conducted in this research. In addition, this chapter will also include perspectives on ethical issues and possible constraints. However, more detailed questions regarding the quality of the research design will be addressed in the last Chapter 6, which represents the Conclusions.

3.1 Research Methodology

The process of designing a research begins with the consideration of the research philosophy. The research philosophy refers to a system of beliefs and assumptions about the development of knowledge. Since, by conducting in research the researcher is, in fact, developing knowledge in a particular field and, thus, has to respect these assumptions. (Saunders *et al.* 2017, p. 124) Furthermore, Burrell and Morgan (1979) have stated that we make assumptions at every stage in our research whether we are consciously aware or not. Saunders *et al.* (2017, p. 124) have introduced different types of assumptions, which are: the realities the researcher encounters in his or her research (ontological assumptions), human knowledge (epistemological assumption), and the degree and ways the researcher's own values influence his or her research process (axiological assumptions). These assumptions shape how the researcher understands the research questions, the methods that are used and how the findings are interpreted (Crotty 1998 as cited in Saunders *et al.* 2017, p. 124). Thus, consistent set of assumptions will constitute a credible research philosophy, which will support the researcher's methodological choice, research strategy, and data collection and analysis techniques (Saunders *et al*. 2017, p. 124). The Figure 21 demonstrates the research philosophy and the set of methods behind this research in the form of so-called research onion.

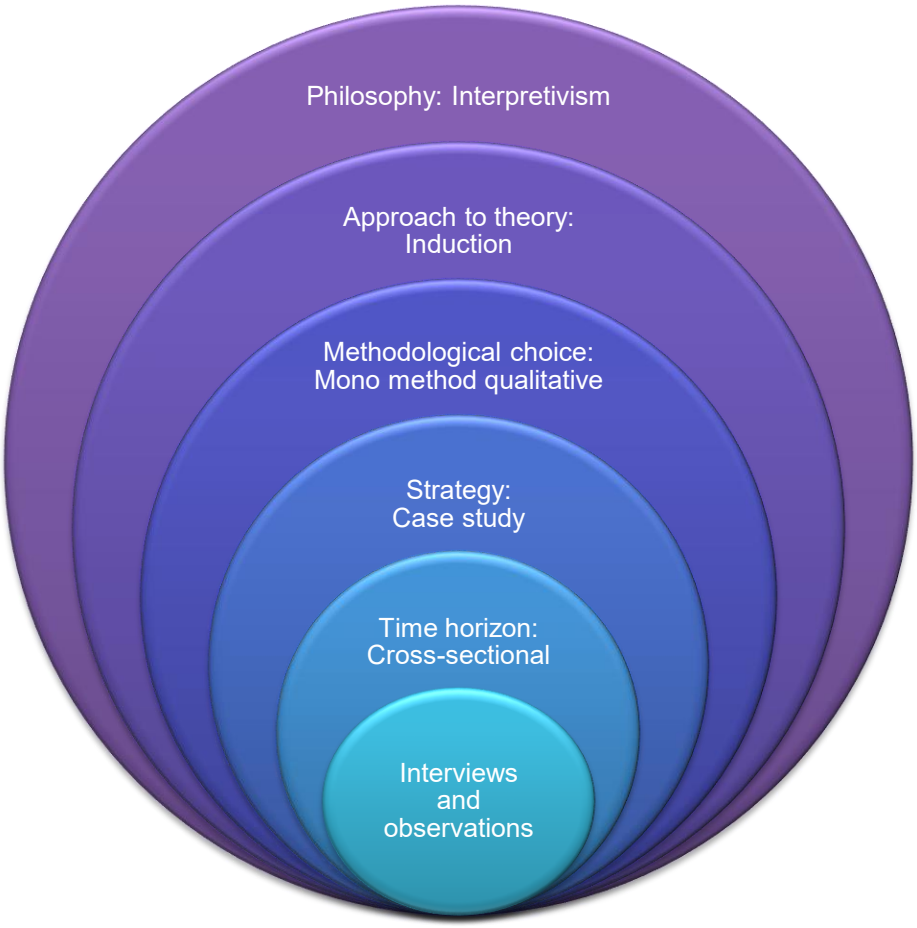

Figure 21. *Research methods applied in this research (adapted from Saunders et al. 2017, p. 164).*

The first layer of the onion demonstrates the research philosophy, which in this case is interpretivism. Next, different assumptions related to interpretivist research philosophy are discussed. The related ontological assumptions, as in the nature of reality or being, can be described as complex, rich, and socially constructed. Epistemological assumptions, as in what constitutes acceptable knowledge, include assumptions of theories and concepts being too simplistic and, thus, the focus is more on perceptions and interpretations. Axiological assumptions, as in the role of values, include that the researchers are subjective part of what is researched, and the researcher's interpretations are considered as key to contribution. Furthermore, the interpretivist research philosophies are typically combined with inductive methods, small samples, in-depth investigations, and qualitative methods. (Saunders *et al.* 2017, p. 136) These statements are also true for this research and, thus, the research philosophy can be recognized as appropriate. Next, in order to properly validate the choice of philosophy, the different assumptions will be elaborated in more detail.

Since the purpose of interpretivist research is to create new, richer understanding and interpretations of social worlds and contexts, it is perfectly suited for this research, which aims to explore the microfoundations of organizational-level process innovation capabilities with an emphasis on individuals and their interactions. (Saunders *et al.* 2017, p. 140) In other words, the ontological assumptions are accurate. To validate further, the previously mentioned research question contains various complex, rich, and socially constructed phenomena, such as microfoundations and capabilities, which are both also highly debated. This, on the other hand, vali-

dates the epistemological assumptions. To summarize, the interpretivist ontological and epistemological assumptions are highly congruent with this research.

In addition, Saunders *et al.* (2017, p. 128) mention an interesting perspective stating that the choice of philosophy reflects the researcher's values, as does their choice of data collection techniques. This is an appropriate statement regarding this research, since the researcher values psychological aspects and believes that vast qualitative data collection through semi-structured and open-ended interview questions will provide the most value for the explorative research topic detailed above. In addition, Saunders *et al.* (2017, p. 141) mention that crucial for the success of interpretivist philosophy is that the researcher must adopt empathetic stance. In respect of this research, the researcher acknowledges herself as naturally empathetic, thus, sees this as an opportunity to explore the topic in-depth with the interviewees. In addition, Alvesson and Sköldberg (2000) point out that it is crucial for researchers to develop their reflexivity, to become aware of and actively shape the relationship between their philosophical position and how they undertake their research (as cited in Saunders *et al.* 2017). Moreover, the researcher also understands the limits of being highly involved. These issues and limits will be discussed in more detail in the Chapter 6. To summarize, also the axiological assumptions related to the interpretivist philosophy are congruent with this research topic, since the researcher acknowledges that her presence and interpretations are key contributions, as suggested by Saunders *et al.* (2017, p. 136).

Now that the first layer of the research onion has been elaborated, we move onto the next layers, which demonstrate the approach to theory and methodological choices. Related to the research philosophy, the interpretivist research philosophies are typically combined with inductive methods, small samples, in-depth investigations, and qualitative methods (Saunders *et al.* 2017, p. 136). This research is not an exception. The approach to theory in this research is inductive methodological approach. To simplify, in other words, the final theoretical framework was constructed based on the interview results and relevant literature instead of, for example, testing an existing theory (Saunders *et al.* 2017). Another way to express inductive approach is to emphasize that the theory follows data (Saunders *et al.* 2017, p. 147). The methodological choice, which was combined with the interpretivist philosophy and inductive approach to theory, was qualitative study. Characteristic for a qualitative research is to study participants' meanings and the relationship between them to develop a conceptual framework and theoretical contribution. Furthermore, in this case, a single data collection technique was utilized. Thus, the research is specifically a *mono* method qualitative study. (Saunders *et al.* 2017, p. 168)

So far, we have validated the interpretivist research philosophy, inductive approach to theory, and mono method qualitative study as our methodological choice. Next, the strategical choice is discussed. The research strategy is a plan of actions of how a researcher aims answer research questions. It can be referred as methodological link between the research philosophy and subsequent choice of methods to collect and analyze data (Denzin and Lincoln 2011 as cited in Saunders *et al.* 2017, p. 177). Furthermore, a case study is an in-depth inquiry into a topic or phenomenon in a real-life setting. Case study fits well into the goals of this research, since case studies are often used when the boundaries between the phenomenon being studied and the context within which it is being studied are not always apparent (Yin 2014 as cited in Saunders *et al.* 2017, p. 184–185). In fact, understanding context is fundamental to case study research (Saunders *et al.* 2017, p. 185). These statements fit well with the study in question, since the explored microfoundations are expected to be found on the micro- or individual-level and the capabilities are expected to reside on the macro- or organizational-level. However, these are mere theorizations and the clear boundaries between these phenomena are impossible to de-

termine. The subject of different level phenomena is discussed in more detail in the section 2.1.1. To conclude, given the exploratory nature of the study and the other validated parts of the research onion, a case study was a natural choice for the strategy. In this case, the in-depth exploration is happening from the viewpoint of one actual case organization.

The next layer of the research onion examines the time horizon of the study. Due to various reasons, the applied time horizon is cross-sectional, which can also be simplified as the snapshot of the situation at a particular time (Saunders *et al.* 2017, p. 200). In practice, the cross-sectional time horizon indicates that the interviews were conducted during a short period of time. In this study, the 23 interviews were conducted within January 2019. However, the time horizon is not recognized as a factor that would have negative effects on the results. Even though the study cannot provide information about the development of the capabilities during a certain time frame, it provides an in-depth snapshot of the current state. This is recognized as valid and sufficient regarding the nature and other design factors of the research. However, despite the cross-sectional nature of the time horizon, it should be noted that the researcher has been working prior to starting the thesis and she also worked during the master's thesis period. Thus, overall, she has been within the organization for a longer period of time, which has various effects regarding the study. Related to the time horizon, some aspects of the researcher's results or discussions could also reflect a broader time frame. The researcher acknowledges her role as a researcher in this regard, as well.

The last layer of our onion discusses the techniques and procedures related to data collection and analysis. The main data collection technique was in-depth semi-structured interviews with open-ended questions. Overall, the researcher conducted 23 separate face-to-face interviews. The interviewees were selected with purposive sampling and a heterogenous aim. In practice, the researcher aimed to interview a diversity of people, in order to get a holistic view from all available perspectives. This included interviewees from the shop-floor to the top management and all the way from accounting to production. In addition, the researcher did have prior knowledge of the population by experience, so she could also add some "star cases". Furthermore, three of the interviewees were asked to analyze the case organization from their point of view, even though they were not part of the case organization themselves. In practice, the researcher interviewed three members of the R&D -department to see how they perceive the case organization and the topics in general.

To summarize, the main goal of the researcher was to compile as vast qualitative data, to be able to explore the underlying microfoundations of process innovation capabilities as holistically as possible. The data collection and analysis will be discussed in more detail in the Subchapters 3.3 and 3.4. To conclude, the choices made regarding this research design consider both the nature of the researcher and the topic. In this case, the methodological choices also comply with the strengths and interests of the individual researcher.

3.2 Research Process

This master's thesis was conducted for the pharmaceutical manufacturing Supply Center of Bayer Oy. The researcher had started to work for the company in May 2018. The case organization is located in Turku, Finland. First, the researcher worked as an Operational Excellence Specialist for the summer. In September, a new master's thesis contract was made. Because of the previous duties in the company, the researcher was already familiar with the organization.

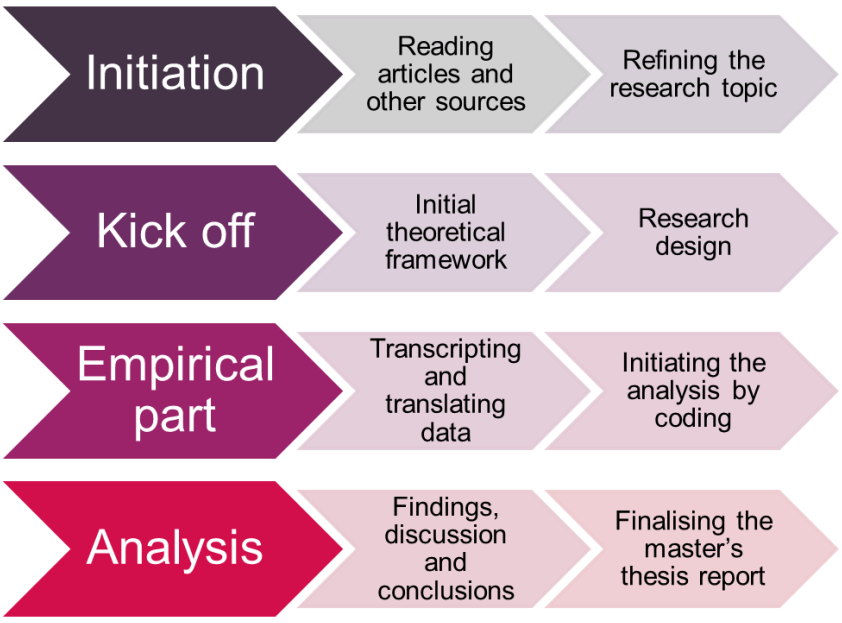

Figure 22. *The primary phases of the research.*

Formally the master's thesis project started in September 2018. However, in addition to the project, the researcher also had simultaneous work duties related to innovation in the organization. The first months consisted of familiarizing with broader topics related to, for example, innovation management and innovation strategy. The first objective was to find a suitable topic and scope for the thesis. The initial thought was to find an interesting and defined topic, which would combine innovation, strategy and perhaps, in addition, some psychology. These topics were both relevant for the case organization but also highly interesting for the researcher. Furthermore, a decision was made that the researcher would conduct a research and based on the results, she would also formulate an innovation development plan for the case organization. Due to the sensitive nature of the information, the development plan will not be presented as a part of this thesis.

The initial kick-off meeting was organized at the end of November 2018. The meeting was held together with the Professor, the company supervisor, and the Vice President of Bayer Oy, who was also the sponsor of the thesis. In the meeting, the selected topic, objectives, and the balance between the theoretical and the practical work were discussed and agreed. By this time, the researcher had compiled an initial literature review to support the next phases of the research. After the meeting, during December 2018, the researcher prepared herself for the interviews, which were held in January 2019. Transcribing and analyzing the results was conducted both simultaneously and, also, after the interviews.

Altogether, the researcher interviewed 23 participants. Most of the interviewees were organization members of the Supply Center. However, in addition, three interviewees were originally members of the R&D -department. Overall, the interviewees varied from shop-floor workers to top management. More details on the interviewee selection will be discussed in the next Subchapter 3.3. Furthermore, the researcher tried to avoid the problem of having too much qualitative data unanalyzed. Thus, having interim summaries at the end of every week helped her to use the following interview sessions more efficiently and simultaneously avoided the problems of being over-saturated with qualitative data. This also helped the researcher to guide the following interviews to directions that would provide more information on specific topics, which had been identified as relevant during the previous interviews and interim summaries.

After the interviews and transcribing and analyzing the data in February 2019, together with the guidance of the empirical results, the initial literature review was molded into a comprehensive theoretical background for this thesis. In practice, more articles were searched, read, and included into the literature review. The articles originated from scientific databases, such as Web of Science and Scopus. Some of the search words were, for example, "microfoundations", "micro-foundations", "dynamic capabilities", "process innovation", "continuous innovation", "continuous improvement", "innovative work behavior", to name a few. Naturally, different combinations were also used. Furthermore, the search results were often arranged by times cited from highest to lowest. In addition, related to certain topics, such as microfoundations and dynamic capabilities, there are well-known and appreciated authors that have contributed to the literature. In order to gain a proper understanding of the discussions and debates around these topics, the work of the famous authors was familiarized specifically. For example, extant literature on microfoundations is a good illustration of emergent and highly debated subject. To summarize, during March 2019, after understanding the indications of the empirical results, the initial literature review was transformed into the final background for the research.

In addition, during March 2019, the empirical results and the theoretical background were integrated to form the final conceptual framework for microfoundations of process innovation capabilities. This is presented in the Chapter 5, which represents the chapter for Discussion. In other words, the extant theoretical background provided a playground to which the empirical results could be integrated to form a new conceptual framework. The conceptual framework in this thesis served as a guidance in exploring and identifying the microfoundations of process innovation capabilities. The main findings, as in the most important microfoundations that were identified, are presented in the Subchapter 6.2. Finally, April 2019 was used to finalize the written thesis report. In addition, the researcher continued with the practical part of the work by designing innovation development actions for the case organization.

3.3 Data Collection

The main data collection method was interviews. The purpose of the interviews was to gather data to be able to answer the three research questions. The research questions were formulated so that the second and the third question would support in answering the main research question. The main research question was to explore the underlying microfoundations for process innovation capabilities. The supporting research questions were related to innovative behavior, motivation, and encouragement of individuals and the effects of digital innovation software on individuals' innovation behavior. The research questions are elaborated in detail in the subchapter 1.2.

Before going into the details of the interviews, it should be elaborated that the researcher aimed to interview a diversity of people, in order to get a holistic understanding of the topic. In addition, it should be noted that the researcher had established a professional relationship with most of the participants prior the interviews. This could be perceived as positive or negative element, depending on the situation. The possible positive influence could benefit of the familiarity and trust between the interviewer and the interviewees. This positive influence could enable more in-depth results and deeper discussions. Especially, since some of the questions are related to psychological aspects and could also be viewed as sensitive. However, the familiarity could also influence the interviewees negatively. To elaborate, the interviewees could want to avoid mentioning negative aspects of the current operations that the interviewer was involved with.

The aim to gather as holistic overview as possible affected the researcher's choice and number of interviewees. For the researcher, the number of interviewees was not of absolute value itself. Instead, she valued the expected qualitative data to be gathered. Thus, since the researcher had prior knowledge on the expected explicit and tacit knowledge, attitudes, and opinions of the interviewees, she felt confident of being able to select both diverse and representative qualitative data set. Furthermore, this way she could avoid some pitfalls of ending up with too much qualitative data that would not be of value or provide enough input for the topic. One way to determine the sample size is, for example, to continue collecting qualitative data until data saturation is reached (Saunders *et al.* 2017, p. 297). Following this and other guidance provided by Saunders and colleagues, the sample size for this in-depth case study with a heterogeneous population was 23 interviewees. A few of the interviews were additional in relation to the initial plan, but they were recognized to provide valuable qualitative data and, thus, contributed to the data saturation.

In addition to the number of interviewees, the characteristics of the interviewees are of importance, too. To be even more specific, the overall sampling followed purposive non-probability technique of maximum variation sampling. This technique enabled the researcher to use her own judgement to select sufficiently diverse interviewees that helped her answer the research questions as holistically as possible and meet the set objectives (Saunders *et al.* 2017, p. 301). In this research, the aim was to choose participants that are particularly informative and diverse for the explorative study. However, this kind of sampling method has implications for the validity and reliability of the study as well. The topic of validity and reliability will be discussed further in the Subchapter 6.3. The overall composition of the interviewees is summarized in the Table 4. Furthermore, as can be seen from the table, the choice of participants is rather heterogeneous and, thus, provides maximized variation.

Table 4. *Data regarding the interviews.*

Location and Position	Number of Interviewees
Supply Center	18
Head of SC	1
Top Management	4
Production Director	1
OE Manager	1
Controlling Manager	1
LCM Department Manager	1
Middle Management	4
Production Manager	3
Supplier Quality Manager	1
Project Lead	1
Specialists	5
HR Business Partner	1
Operational Excellence	1
Production Engineer	1
Quality Specialist	1
Reliability Engineer	1
Production	3
Foreman	1
Production Worker	2
R&D	3
Head of R&D	1
Department Manager	1
Senior Scientist	1
Nordic Organization	2
IT Business Partner	1
Digital and Innovation Lead	1
Total	23

The main source of the vast qualitative data was 23 semi-structured interviews with open-ended interview questions. This kind of data was recognized as most beneficial for the explorative study, which aims reveal the microfoundations of process innovation capabilities. What cannot be seen in the Table 4, however, is that some of the participants had long backgrounds in the company, while a few had relatively short backgrounds of only 6 months or so. This was also recognized as beneficial, since the newer employees had a different view on certain aspects of the organization and activities related to the topic. To conclude, in the end, the interviewees varied from shop-floor workers to top management and function-wise from accounting to production. In addition, the researcher interviewed three members of the R&D -department and two members of the Nordic organization. The Table 4 shows of the total 23 interviewees18 were currently employed within the actual case organization.

Now that the sampling method has been demonstrated, it is appropriate to specify the interview contents. In the beginning of the interviews, the interviewer introduced the subject and the objectives of the thesis. In addition, she mentioned that the identities of the interviewees would stay confidential. The conducted interviews were in-depth and semi-structured by nature and they were compiled with open-ended questions. The overall durations of the interviews were approximately one hour. The overall contents included 3 main topics, which were congruent

with the research questions. First topic aimed to gain understanding of the microfoundations of process innovation capabilities. However, the topic was approached from a variety of angles to lead the participant to think deeper and deeper into the subject. The second topic was concerned of motivation and encouragement of employees. This subject was approached from a variety of angles, too. The third topic concentrated on the effects of innovation management software on individuals' innovative behavior. Altogether, various individual and contextual factors related to the 3 main topics were explored and discussed together with the participants.

In this case study the interviewees did not receive prior information of the questions or the contents of the topic. The only information interviewees were given revealed that the interview is going to concentrate on innovations. This was a conscious choice made by the researcher, since she wanted to build the interview situation in a certain way. The researcher was concerned that giving interviewees' prior time to rehearse the questions could lead them to wrong cognitional paths regarding, for example, the meanings of terms and concepts. This way, before the interviewees could be influenced by prior knowledge or interpretations, they acknowledged the proper context they are setting their opinions to. This enabled the minimization of possible misunderstandings. In fact, several interviews incorporated a discussion of the meaning of innovation and how process innovations and continuous improvements relate to each other. So, this way the researcher could explain how she acknowledges these terms in respect to her research.

In addition, the interviewer also aimed to help the interviewees to answer the, sometimes quite challenging, questions. The interviewer even got feedback, that the interviewees enjoyed the way the interviewer eased them into the topics and was able to open new lines of thoughts. Thus, the interviewer had an active role in shaping the interview situations. Moreover, the interviewer modified the interview questions and their number according to the specific situation and prior answers. However, this is a natural part of non-standardized data collection, which is typical for qualitative interviews (Saunders *et al.* 2017, p. 168). These aspects will also be discussed in more detail in the Section 6.2, which concentrates on reliability and validity.

3.4 Data Analysis

To recap, this is a mono method qualitative study with an inductive approach to theory. Secondly, the study integrated the interactive nature of qualitative data collection and analysis, which represents an interconnected process of analysis and interpretation of data during each interview or observation (Saunders *et al.* 2017, p. 566). Furthermore, as mentioned in the Subchapter 3.1, qualitative data is often associated with an interpretivist philosophy, since researchers need to make sense of the subjective and socially constructed meanings expressed by interviewees. Moreover, social constructionism indicates that partially shared meanings and realities are dependent on individual's interpretation of situations that occur around them. Due to these factors, qualitative data is likely to be more varied, elastic, and complex than quantitative data and, thus, analysis and understanding of the data needs to be sensitive to these characteristics to be meaningful. To summarize, analyzing qualitative data is often partially simultaneous with the collection of the data and the analysis of the data requires solving socially constructed meanings, too. (Saunders *et al.* 2017, p. 566–568)

In the case of inductive approaches, which do not use a predetermined theoretical framework, the aim is to search and recognize meanings in the data and to understand the social context perceptions of research participants (Saunders *et al.* 2017, p. 571). This was also the purpose of this thesis, since the studied microfoundations are often influenced by, for example, individual

and contextual factors and their interplay. Thus, the emergent theory will be grounded in the case organizational context (Saunders *et al.* 2017, p. 571). To note, it is also common that an inductive study will incorporate some elements of deductive approach as well, since there is interplay with the existing theory and the emergent propositions through the data collection and analysis (Saunders *et al.* 2017, p. 571). In this research, the interview findings clarified the theoretical background and the emergent propositions were also partially discussed and tested with other participants to see if some these had actual value. Thus, the process of theory building and the data analysis were somewhat simultaneous, even though this study is mainly an inductive study. However, the final conceptual framework and the identified main microfoundations for process innovation capabilities integrated extant literature with the new emergent propositions.

Furthermore, as implicated earlier, the nature of qualitative data has various implications for their analysis. This kind of non-standardized data will expectedly be high in volume and complex by nature. (Saunders *et al.* 2017, p. 568) This was especially true in the case of this research, since it included 23 audio-recorded in-depth interviews. To ease the complexity and high volume of the data, the interviews were transcribed and analyzed during and immediately after each interview. In addition, the researcher made an interim summary of the results at the end of each week during the interviewing phase. This was a way to steer and emphasize certain areas of the interviews and, thus, the initial analysis had meaning for the following interviews and the data that was collected. This is a good tactic to use with an explorative study and inductive approach to theory, since it enables to assess which themes are emerging from the data as the work progresses (Saunders *et al.* 2017, p. 570). Saunders and colleagues also emphasize that in these kinds of studies, the theory emerges from the data collection, analysis, and interpretation.

After recording and transcribing the data at the end of January 2019, the primary analysis phase started. By this the researcher means that the transcribed data was transferred to Excel for further processing. The researcher felt that she became very familiar with the data during the interviews and the process of transcribing. To note, all the data was collected during three weeks' time, so the data collection and partial analysis phase was intense. Moreover, it enabled the researcher to gain an in-depth understanding of the subject. The interim summaries done after each week were also helpful for recognizing emergent patterns early on.

After the data was transferred to Excel, the researcher began the coding of the data. In practice, coding means that the researcher uses code words to categorize data with similar meanings (Saunders *et al.* 2017, p. 580). In this case the code words were both data and theory driven (Saunders *et al.* 2017, p. 582–583). The first phase of the coding was done in high detail to ensure the richness of the qualitative data. Each relevant point made by the interviewees were coded separately. To keep the data organized, the coded data was also assembled under themes and phenomena. This helped the researcher to sort the vast amount of complex qualitative data and recognize emergent patterns.

Second, after having codified and organized the qualitative data related to each topic of interest, the pieces of data were integrated into broader and more coherent set of factors, which later served as the base for the microfoundational exploration. The final empirical results are presented in the Chapter 4. The results are visualized with tables, which aim to explain the identified factors and their weights. The weights of the factors were determined by how many interviewees were perceived to mention the particular factor in each context. The orientations of the weights are presented either as positive (+) or negative (-) up to five units. The orientation of a

factor was dependent on the perceived influence of each factor on a specific topic. In other words, the weights can be described as a qualitative ranking system for the established factors, despite being quantitative by nature. Next, a practical example of the data analysis phase is demonstrated.

When the interviewees were asked questions about the enablers and hindrances for process innovation capabilities, the answers were first transcribed in high detail. The transcribed data was then coded and sorted into more saturated pieces of data. These coded pieces of data were afterwards integrated with other similar pieces of data and finally assembled into meaningful factors with weights. In practice, the weight of the factor reflects the amount of integrations or mentions by interviewees within each topic. This was enabled by the high detail of the initial phases of the data analysis. For example, the empirical findings suggest that resources are the second highest weighing enabler for process innovation capabilities with a weight of four positive units. A few example answers, which contributed to the weight of the factor, are presented next.

“If you want to invest in process innovation activities, you need resources.”

"Creativity needs the environment to comply. In order to achieve our innovation related goals, we need resources."

“In addition to operational work, it’s hard to find the time for innovation. It needs resources such as time, personnel, and financials to be able to look outside the box.”

“Innovation should begin with strategy and set targets, which are then enabled by resources.”

To conclude, it should be kept in mind that the weights of the factors provide merely a direction on which factors were perceived to be mentioned the most. The weights should not be given as much importance as the broad and rich qualitative data in the form of the identified factors.

4. EMPIRICAL FINDINGS

This chapter presents the empirical interview results. These results are demonstrated through six different themes. First, the perceived value of process innovation capabilities is introduced. To elaborate, the section provides insight on how the importance and role of process innovation is perceived through the lens of pharmaceutical manufacturing. Second, the antecedents of process innovation capabilities are presented. In practice, during the interviews, the enabling and hindering factors of process innovation capabilities were identified according to the opinions of the interviewees. The next demonstration focuses on the established key facilitators of process innovation capabilities. To clarify, the section provides insight on which of the identified antecedents the case organization is perceived to be strong in. Then, more emphasis is placed on individuals, innovative behavior, and motivational factors of individuals. After concentrating on the human agency, the next section examines the findings related to the contextual and cultural aspects within the case organization. To conclude, the last illustration focuses on the effects of internally crowdsourced digital innovation management software on process innovation capabilities. To note, all the empirical findings presented in this chapter origin from the broad set of qualitative data from the conducted semi-structured interviews. Thus, the results are strongly bound to the case organization and its organizational and macro-environments.

4.1 Perceived Value of Process Innovation

As mentioned, so far, studies regarding the pharmaceutical industry have mainly focused on product innovation or the discovery and development of new drugs rather than process innovations, which are generally more related to changes in the manufacturing processes (Lugovoi *et al.* 2018). However, on behalf of the value of process innovation speaks its role in supporting product innovation and overall operational performance of, for example, the production processes (De Figueiredo & Kyle 2006; Ballot *et al.* 2015). In addition, it should be acknowledged that manufacturing is a far greater cost driver for the pharmaceutical industry than is generally acknowledged (Price 2013, 2014). The above statements were also present in the case organization's interviews. It was commonly confirmed that process innovations have a role in supporting product innovation and overall operational performance in production and supporting processes. Furthermore, these confirmations add to the relevance and importance of the overall topic of this thesis.

In addition to previously mentioned general acknowledgments, more detailed results are presented in the Table 5 below. To note, the numbers within the brackets in the table relate further to the Table 6 in the next Section 4.2, which introduces the overview of enabling and hindering factors of process innovation capabilities. The demonstrated weights indicate the relational weight of a particular factor within the population of factors. The population of factors stands for the factors within a certain topic or table. The weight is determined by how many interviewees were perceived to mention the particular factor. The orientations of the weights are presented either as positive (+) or negative (-) up to five units. In other words, it is a qualitative ranking system for the established factors. However, the weights of the factors provide merely a direction on which were mentioned the most. The weights should not be given as much importance

as the broad qualitative data itself. To add, the Table 5 diversifies some factors that could have been linked to broader or more collective concepts. However, a decision was made that this approach allows more depth in the findings. It was also seen as beneficial for the microfoundational exploration.

Table 5. *Perceived value and role of process innovations in the pharmaceutical supply center.*

Perceived Value and Role of Process Innovations	Weight
Digitalization and Industry 4.0, Environmental Pressure (15), Strategic Management Digitalization and the new industrial revolution cause pressure to develop. For example, data and analytics were perceived as increasing in importance. In addition, a dynamic future-looking perspective incorporated within the whole organization was emphasized as a principal factor. Partially due to the above-mentioned factors, process innovations were acknowledged to increase in importance in the new digital era. The number (15) indicates the relationship with the results in the Table 6. In other words, digitalization and environmental pressure was the 15th identified factor to enable or support process innovation capabilities.	+++++
Continuous Improvement ⇔ Continuous Innovation It was highlighted during the interviews that process innovations should be present in all operations within the organization, including manufacturing, business processes, supporting activities, digital solutions, and everyday work overall. In addition, various interviewees mentioned that they recognize innovation as something that should be linked with Operational Excellence and Continuous Improvement -concepts. Thus, it can be stated that the organization is underlining the importance of continuous innovation practices. It was commonly accepted that employees should be continuously seeking ways to enhance the existing operations.	+++
Business Continuity and Renewal Process innovations were recognized as a crucial component in pursuing the continuity and renewal of business operations overall.	++
Experimentation (32) The pharmaceutical industry is not famous for being naturally well-performing in manufacturing process related agility and experimentation. However, experimentation was identified as something to be pursued by the organization. Furthermore, experimentation is an emphasized component of the organizational culture MNC wide. The number (32) indicates the relationship with the results in the Table 6. Experimentation was established as the 32nd factor to enable process innovation capabilities overall.	++

4.2 Antecedents of Process Innovation Capabilities

The first and main research question of this study was to explore the microfoundations of process innovation capabilities. As explained, the question is not easily defined and requires a set

of assumptions, definitions, and clarifications. Therefore, the research question was first approached from a slightly broader perspective, which was initially considered to be easier for the interviewees to comprehend without a comprehensive prior background on the topic. The initial interview results of the enablers and hindrances of process innovation capabilities are presented in the Table 6 below. To add, the actual and final microfoundational exploration was done from the initial results presented in this Chapter 4. The identified microfoundations are presented in the Subchapter 6.2, which concentrates on the main findings.

As in the previous Table 5, the demonstrated weights in the Table 6 indicate the relational weight of a factor within the population of factors. The population of factors stands for the factors within a certain topic or table. The weight is determined by how many interviewees were perceived to mention the particular factor. The orientations of the weights are presented either as positive (+) or negative (-) up to five units. In other words, it is a qualitative ranking system for the established factors. However, as mentioned earlier, the weights of the factors provide merely a direction on which were mentioned the most. These factors should not be given as much importance as the broad qualitative data itself. To add, the Table 6 diversifies some factors that could have been linked to broader or more collective concepts. However, a decision was made that this approach allows more depth in the findings. It was also seen as beneficial for the microfoundational exploration.

Table 6. *Enablers and hindrances for process innovation capabilities.*

Enablers and Hindrances for Process Innovation Capabilities	Weight
(1) Culture Culture that supports innovation and development. Integral parts are experimentation and continuous renewal.	+++++
(2) Resources Time to innovate and think strategically. Perceived time pressure has various effects on individuals and their interactions. In addition to time, other resources, such as financial, were perceived as highly relevant.	++++
(3) Digital Innovation Management Software The internally crowdsourced digital innovation management software makes innovation activities more visible and simultaneously supports and strengthens the organization's innovation culture. The software is open to everyone and, thus, fosters co-creation and high involvement of innovation. Overall, the software is easy to use, functional, and transparent. To summarize, it provides a collective virtual knowledge creation context through which the organization can foster process innovation related activities during the innovation process.	+++
(4) Collaboration and Open Innovation Collaboration within the organization and with external partners such as academia, authorities, and suppliers. Interviewees sensed a trend towards increased Open Innovation. In addition, fostering MNC wide collaboration was recognized as an important enabler for the Supply Center. For example, other functionally similar units were emphasized as possible sources for valuable knowledge and collaboration opportunities.	+++

(5) Atmosphere for Innovation Employees had the feeling that innovation and related activities are increasing in importance overall. It was broadly acknowledged that there should be an innovational perspective in everything, for example, business processes, supporting activities, digital solutions, and everyday work overall. It was also clear that innovations are perceived as crucial for continuity and renewal.	+++
(6) Dynamic Leadership Strong, committed, and dynamic leadership supportive of innovation was acknowledged as highly beneficial for innovation related activities. It was acknowledged that managers should act as role models for the organization and inspire employees to be proactive. Therefore, also management training was confirmed as a key factor for fostering desired management behavior. In addition, it was recognized that strong emphasis on innovation from the MNC's board has value. The MNC has a strong innovation strategy, which strengthens the Supply Center's innovation activities, too.	+++
(7) Innovation Management It was widely recognized that for fostering process innovation capabilities, there should be strategic innovation management perspective within the organization. This indicates, for example, long-term focus, goals, resources, and clear processes for distinct phases of the innovation process.	+++
(8) Open Atmosphere Open atmosphere can be identified to be related to the overall culture. Furthermore, open atmosphere was recognized as a contributing factor for the whole innovation process. Honesty was mentioned in this context as well.	++
(9) Low hierarchy Low hierarchy, as the perceived hierarchy of the organization, reflects, for example, how effortless it is for the individuals within the organization to collaborate with each other. In the case organization, it was commonly acknowledged that the hierarchy is low and, thus, people are perceived as open and eager to communicate their ideas in various knowledge sharing contexts. This can contribute to the feeling of psychological safety as well.	++
(10) Knowledge and Learning It was established that employees have vast knowledge profiles, which is a considerable enabler for process innovation capabilities. Moreover, there was a perceivably strong linkage between increased knowledge in automation, in the form of hired automation engineers, and completed innovation activities. In addition to previously acquired information, individuals' learning abilities are crucial for the future innovation related activities and the development of individuals overall.	++
(11) Long Employee Backgrounds in the Organization Long employee backgrounds in the organization were considered a double-edged sword. However, more commonly the factor was perceived as a positive influencer, since it can be acknowledged to strengthen the explicit and tacit knowledge base of the employees.	++

(12) Psychological Safety Psychological safety, trust, and "okay to make mistakes" -atmosphere were identified as key factors contributing to the innovative work behavior of the employees.	++
(13) Encouragement and Empowering The value of enthusiastic and inspiring individuals was identified as highly beneficial. According to the interviewees, the perceived encouragement could origin from either colleagues or managers. However, the influence of managers' feedback and encouragement was recognized as having stronger impact.	++
(14) Internal Communication and Marketing The more visible innovations are, the more it was agreed to motivate employees to contribute to innovation related activities. Success stories and innovation performance reports were named as good examples of motivational communication.	++
(15) Digitalization / Environmental Pressure This factor was highlighted as one of the most value enhancing from the process innovation perspective in the previous Table 5. As mentioned, environmental pressure, digitalization, and the new industrial revolution cause pressure to develop process innovation capabilities. In addition, the need for dynamic future-looking perspective incorporated within the whole organization was emphasized. Moreover, data and analytics were identified to provide new opportunities for innovation in the future.	+
(16) Organizational Support Supportive environment, including colleagues and managers, was identified as an important enabler in building and maintaining innovation-oriented culture.	+
(17) Individual Wellbeing It was commonly recognized that the wellbeing of an individual contributes to their innovative work behavior. Thus, enhancing and maintaining individuals' level of wellbeing is an enabler for process innovation activities. In other words, a dissatisfied person is not prone to proactivity at the workplace.	+
(18) Rewards Rewards, such as money and feedback, were identified to encourage and motivate employees to engage in innovative work behavior. More in-depth empirical findings related to motivation and encouragement is presented in the Subchapter 4.4.	+
(19) Collaboration with R&D The R&D-department and the case organization are located at the same site in Turku. During the interviews, the possible benefits to be gained from close collaboration in product and process innovation related activities were highlighted.	+
(20) Organizational Confidence Previous production development success was identified to contribute to the current process innovation capabilities. This factor can be conceptualized as organizational confidence, which highlights the effect of history on the current organizational context.	+

(21) Agile and Flexible Organization It was commonly agreed that for an organization to have flourishing process innovation capabilities, it should have an agile and flexible organization. This was explained with the fact that rigid organizational structures were recognized as possible sources of hindrances for development. Furthermore, sufficient amount of flexibility was identified as necessary to be able to implement process innovations, for example, in the production processes.	+
(22) Diversity of Employees, Conflict During the interviews, it was recognized that certain amount of healthy conflict, such as questioning the current operations and diversity of employees, supports process innovation capabilities.	+
(23) Learning from Mistakes Learning from mistakes was identified as a supporting factor for process innovation capabilities. This factor emerged in the same context as experimentation (32).	+
(24) Motivation Motivated employees with elevated levels of, especially, intrinsic motivation were identified as an important success factor for the organization's process innovation capabilities. More in-depth empirical findings related to motivation and encouragement is presented in the Subchapter 4.4.	+
(25) Employee Relationships During the interviews, it was discussed that personal relationships increase the level of collaboration and knowledge sharing among individuals. On the other hand, long backgrounds and the proximity of R&D-department were recognized to contribute to the relationships between employees.	+
(26) Committed Employees Committed intellectual capital was identified as an enabler for process innovation capabilities. This factor was usually discussed in the same context with long backgrounds (11) and vast knowledge profiles and learning (10).	+
(27) Physical Place to Innovate Innovation is acknowledged to require the integration of knowledge. This kind of activity, when carried out by multiple individuals, needs a collective knowledge sharing context. It can be either virtual or physical. In the case organization, there is a virtual media in the form of internally crowdsourced innovation management software (3). However, another important identified factor was a physical place for interacting with other enthusiastic innovation-oriented people for fostering process innovation.	+
(28) Employee Innovation The employees within the organization were recognized as the foundation for innovation. The general opinion was that everyone should be involved, from the shop-floor to the top management. In other words, high involvement was acknowledged as beneficial.	+

(29) Innovation Strategy This factor is strongly related to innovation management (7). Innovations should be visible in strategy and goals. Thus, innovation strategy can be perceived as an integral part of successful innovation management practices.	+
(30) Trust and Flexibility for Employees Trust and flexibility for employees were identified as enablers, since it was recognized that when people are granted with trust, they reciprocate it. Also, working from home could provide more stimulating environment for fostering innovative work behavior.	+
(31) Encounters with Right Employees This factor is partially related to the factor of physical place to innovate (27). The factor emphasizes the meaning of random encounters and discussions with the right people. Encounters with the right individuals can foster innovation related activities all the way from idea generation to implementation.	+
(32) Experimentation Experimentation was identified to contribute to organizational learning and knowledge creation. To note, experimentation is also valued in the case organization's culture (1).	+
(33) Self-efficacy Self-efficacy is a factor, which is often associated with entrepreneurs. The term is related to confidence and emphasizes, for example, one's ability to exert control over his or her behavior and environment. In this case, the factor can be related to organizational confidence (20), too.	+
(34) Courage Courage can be linked with self-efficacy (20). This enabler was identified as especially beneficial in the pharmaceutical industry. The regulatory environment could hinder the will to develop, so there needs to be courage and willingness to change the status quo, even though it would result in additional regulatory work.	+
(35) HR Capabilities First, the hiring process needs to be beneficial for the organization. Relational stars can result, for example, in firm-level knowledge advantages. Furthermore, exceptional individuals could have the ability to encourage others to be more productive at knowledge sharing and integration. Second, it was recognized that individuals need to be in the right job and wellbeing, to be motivated.	+
(36) Project Management Capabilities Project management capabilities were highlighted to support the process innovation capabilities.	+
(37) Increased Motivation Through Implementation It was recognized that employees need to experience that their ideas get attention and that good ideas are implemented, in order to be motivated to pursue new ideas and to stay engaged in innovative work behavior.	+

(38) Repetitive Work Environment Repetitive work environment, for example in production, was thought to produce more ideas for improvement.	+
(39) Decline of Motivation During the interviews, it was discussed that the lack of motivation can have drastic consequences on the innovative work behavior of individuals. Furthermore, there can be various underlying factors underneath decreased motivation.	-
(40) Increased Complexity When the organization is doing too much at once, it can lead to increased complexity. This can have hindering effects on innovative work behavior. Due to, for example, lack of resources or sufficient cognitive abilities.	-
(41) Mindset Problems Some employees have attitude and mindset problems. It was recognized that problematic mindsets diffuse easily within the organization. This can lead to drastic negative influence on innovative work behavior, especially related to idea generation.	-
(42) Lack of Focus This factor relates to innovation management (7) and innovation strategy (29). Lack of innovation management and strategy can be perceived as lack of focus, which can lead to, for example, insufficient resources. In addition, resources were identified as the (2) most beneficial factor for fostering process innovation overall.	-
(43) Regulations and Authorities As mentioned, pharmaceutical manufacturing is highly regulated. This can have vast consequences on the overall mindsets and operations. To summarize, regulations and authorities make the implementation of innovation more complex, since innovations and solutions need to comply with all the necessary regulations. In addition, changes might require complex and time-consuming additional bureaucracy. These can lead to additional mindset problems as well.	-
(44) Resistance to Change Relates to, for example, decreased motivation (39), mindset problems (41), and regulations and authorities (43).	-
(45) Lack of Time and Resources This factor relates to resources (2), innovation management (7) innovation strategy (29) and to the lack of focus (42). Lack of time and resources was identified as the most hindering factor. Therefore, it can be stated to emphasize the meaning of the other factors (2), (7), (29) and (42).	- -

4.3 Facilitators for Process Innovation Capabilities

While studying the enablers and hindrances for process innovation capabilities, the factors that were already strongly present in the case organization were identified simultaneously. The Table 7 summarizes the case organization's current key strengths for facilitating process innovation capabilities.

As in the previous tables, the demonstrated weights in the table indicate the relational weight of a factor within the population of factors. The population of factors stands for the factors within a certain topic or table. The weight is determined by how many interviewees were perceived to mention the particular factor. The orientations of the weights are presented either as positive (+) or negative (-) up to five units. In other words, it is a qualitative ranking system for the established factors. However, as mentioned earlier, the weights of the factors provide merely a direction on which were mentioned the most. The weights should not be given as much importance as the broad qualitative data itself. To add, the Table 7 diversifies some factors that could have been linked to broader or more collective concepts. However, a decision was made that this approach allows more depth in the findings. It was also seen as beneficial for the microfoundational exploration. To add, the numbers within the table relate back to the table 6 in the next section 4.2, which introduces the overview of enabling and hindering factors for process innovation capabilities. The previous table 6 has the same explanations for the factors.

Table 7. *Facilitators for process innovation capabilities.*

Facilitators for Process Innovation Capabilities	Weight
Collaboration (4) Collaboration within the organization and with external partners such as academia, authorities, and suppliers. Interviewees sensed a trend towards increased Open Innovation. In addition, fostering MNC wide collaboration was recognized as an important enabler for the Supply Center. For example, other functionally similar units were emphasized as possible sources for valuable knowledge and collaboration opportunities.	++++
Open Atmosphere (8) Open atmosphere can be identified to be related to the overall culture. Furthermore, open atmosphere was recognized as a contributing factor for the whole innovation process from idea generation to implementation. Honesty was mentioned in this context as well.	+++
Low Hierarchy (9) Low hierarchy, as the perceived hierarchy of the organization, reflects, for example, how effortless it is for the individuals within the organization to collaborate with each other. In the case organization, it was commonly acknowledged that the hierarchy is low and, thus, people are perceived as open and eager to communicate their ideas in various knowledge sharing contexts. This can contribute to the feeling of psychological safety as well.	++
Vast Knowledge Profiles of Employees (10) It was established that employees have vast knowledge profiles, which is a considerable enabler for process innovation capabilities. Moreover, there was	++

a perceivably strong linkage between increased knowledge in automation, in the form of hired automation engineers, and completed innovation activities. In addition to previously acquired information, individuals' learning abilities are crucial for the future innovation related activities and the development of individuals overall.	
Collaboration with R&D (19) The R&D-department and the case organization are located at the same site in Turku. During the interviews, the possible benefits to be gained from close collaboration in product and process innovation related activities were highlighted.	++
Organizational Confidence (20) Previous production development success was identified to contribute to the current process innovation capabilities. This factor can be conceptualized as organizational confidence, which highlights the effect of history on the current organizational context.	++
Long Backgrounds of Employees (11) Long employee backgrounds in the organization were considered a double-edged sword. However, more commonly the factor was perceived as a positive influencer, since it can be acknowledged to strengthen the explicit and tacit knowledge base of the employees.	++
Employee Relationships (25) During the interviews, it was discussed that personal relationships increase the level of collaboration and knowledge sharing among individuals. On the other hand, long backgrounds and the proximity of R&D-department were recognized to contribute to the relationships between employees.	+
Committed Employees (26) Committed intellectual capital was identified as an enabler for process innovation capabilities. This factor was usually discussed in the same context with long backgrounds (11) and vast knowledge profiles and learning (10).	+
Encouragement and Empowering (13) The value of enthusiastic and inspiring individuals was identified as highly beneficial. According to the interviewees, the perceived encouragement could origin from either colleagues or managers. However, the influence of managers' feedback and encouragement was recognized as having stronger impact.	+
Motivated Personnel (24) Motivated employees with elevated levels of, especially, intrinsic motivation was identified as an important success factor for the organization's process innovation capabilities. More in-depth empirical findings related to motivation and encouragement is presented in the Subchapter 4.4.	+
Innovation Culture (1) Culture that supports innovation and development. Integral parts are experimentation and continuous renewal.	+

4.4 Individual Perspective on Process Innovation Capabilities

The second research question of this study was to explore the underlying individual mechanisms to innovate. In practice the results reveal how to encourage and motivate employee's innovative behavior. This section provides insight into perceived attributes of innovation-oriented people and the motivational factors that influence individuals. In addition, some facilitating activities for fostering employee innovation are presented. Altogether, this section underlines the individual perspective on process innovation related capabilities. The Table 8 begins with identifying the attributes that were associated with innovation-oriented people by the interviewees. Some of the presented results cannot be categorized as characteristics, abilities, or psychological foundations of innovation-oriented people, but they were highlighted during the conversations and, thus, presented in the same table.

As in the previous tables, the demonstrated weights in the Table 8 indicate the relational weight of a factor within the population of factors. The population of factors stands for the factors within a certain topic or table. The weight is determined by how many interviewees were perceived to mention the particular factor. The orientations of the weights are presented either as positive (+) or negative (-) up to five units. In other words, it is a qualitative ranking system for the established factors. However, as mentioned earlier, the weights of the factors provide merely a direction on which were mentioned the most. The weights should not be given as much importance as the broad qualitative data itself. To add, the Table 8 diversifies some factors that could have been linked to broader or more collective concepts. However, a decision was made that this approach allows more depth in the findings. It was also seen as beneficial for the microfoundational exploration.

Table 8. *Attributes of innovation-oriented people.*

Attributes of Innovation-oriented People	Weight
Cognitive Abilities Knowledge generation and integration abilities were emphasized. Interviewees recognized that the more knowledge a person has acquired, the more integration possibilities for new combinations of knowledge exists.	+++++
Introverts and Extroverts The interviewees recognized that innovation-oriented people can be either extroverts or introverts. Moreover, extroverts were generalized as people who eagerly participate in brainstorming, whereas introverts as people who process their ideas further before announcing them. However, both types were perceived as likely to engage in innovative work behavior.	+++++
Curious The hunger for knowledge was identified as an attribute related to innovation-oriented people.	++++
Open and Development-oriented Openness instead of being closed and judgmental towards new ways of operating. In other words, persons flexibility and agility to modify one's own behavior and mindset.	+++

Courage and Bravery The interviewees explained the need for courage and bravery as the willingness to take risks and simultaneously accepting the possibility of making mistakes. In addition, the fear of judgement was identified as a factor that could hinder innovative work behavior.	+++
Problem Solving -oriented The tendencies to solve problems and ask questions were also seen as closely related to innovation-oriented people.	+++
Positive, Excited and Passionate Relatively large portion of the interviewees felt that positive, excited, and passionate attitudes can be linked to innovation-oriented people. Some opinions also highlighted the impact of passionate individuals on others. One interviewee mentioned that having a passionate colleague greatly encouraged him/her to pursue innovation related activities, too. To conclude, this emphasizes the role of individuals in building and maintaining capabilities.	+++
Social Intelligence and Collaboration Social intelligence of the innovator was perceived as one of the factors that determines organizations willingness to implement ideas. In other words, it was identified that the ability to market and sell one's idea was crucial in getting one's idea to be implemented.	++
Experimentation-oriented Relates to other attributes, such as "Open and Development-oriented" and "Courage and Bravery". Moreover, this attribute can be perceived as emphasizing the willingness to try new things and learn through experimentation. This can be associated with, for example, methods like Lean Startup, which enables fast trial and error -learning.	++
Vast Knowledge and Backgrounds Partially related to the first attribute "Cognitive Abilities". However, vast knowledge profiles and knowledge gained through experience act merely as fuel for cognitive abilities. In other words, to benefit innovative capabilities, cognitive abilities need knowledge as input.	++
Anyone Can Become an Innovator While discussing the attributes of innovation-oriented people, some interviewees mentioned that anyone can become an innovator. This emphasizes the fact that despite the identified attributes of innovation-oriented individuals, there are exceptions.	++
Ambitious and Driven Interviewees recognized that people who are ambitious and driven are more likely to want results and, thus, are more eager to strive for change.	++
Sensing Ability	+

In this case, sensing can be identified as the ability to sense the surrounding environment and see opportunities to be seized.	
Self-efficacy Self-efficacy is often related to entrepreneurs. This attribute can be acknowledged as one's belief in his or her capacity or confidence in the ability to exert control over one's own motivation, behavior, and social environment.	+
Slightly Carefree A person who is not concerned of the consequences or other people's opinions was perceived to be more likely to engage in innovation related activities.	+
Questioning the Status Quo People, who are willing to disagree, contest, and question things, was perceived to be more likely to engage in innovation related activities.	+
New and Young People New and especially young people were recognized as more likely to identify possibilities for improvements and, thus, more likely to engage in innovation related activities. It was widely recognized that sometimes when people spend too much time on doing certain things, they become blind to the available development opportunities.	+
Creativity People with creativity were identified as being more likely to engage in innovation related activities.	+
Persistent The ability to handle rejection was recognized as important. A person could face resistance, but sometimes they need to keep on trying to sell their idea to convince backers or sponsors. However, sometimes one should be able to renew and let ideas go, too.	+
Seizing Ability Seizing can be recognized as the ability to act on the sensed opportunities and take them to the next level closer to actual implementation.	+

In addition to all the identified attributes, the conversations with the interviewees revealed other interesting findings, too. Some of the interviewees distinguished idea rich people, in other words, the brainstormers from the idea executors. They also added that usually both types are needed. Brainstormers can be perceived as fueling the executors. Another finding during the conversations was related to the worldviews of the employees. Some interviewees felt that people who understand and try to understand other people and the world around them are usually more prone to innovation related activities. In addition, as can be seen from the Table 8 above, the cognitive abilities were highlighted more than possessing the actual knowledge beforehand. This can be interpreted as interviewees believing that the required knowledge can be attained or learned easier than the cognitive abilities. Furthermore, despite the identified attributes related to innovation-oriented individuals, possessing these attributes does not guarantee that the potential within an individual is transformed into desired behavior and action. Altogether, individuals can be recognized as microfoundational building blocks for innovation related capabili-

ties, but to seize the potential requires support and input from the whole contextual environment, too.

One concept that is traditionally closely linked to the performance and behavior of people is motivation. Motivation can be identified as one of the factors, which can help in seizing the potential within the individuals in the organization. The Table 9 is constructed similarly as the previous tables and it presents the identified influencers for motivation. The demonstrated weights in the table indicate the relational weight of a factor within the population of factors. The population of factors stands for the factors within a certain topic or table. The weight is determined by how many interviewees were perceived to mention the particular factor. The orientations of the weights are presented either as positive (+) or negative (-) up to five units. In other words, it is a qualitative ranking system for the established factors. However, as mentioned earlier, the weights of the factors provide merely a direction on which factors were mentioned the most. They should not be given as much importance as the broad qualitative data itself. To add, the Table 9 diversifies some factors that could have been linked to broader or more collective concepts. However, a decision was made that this approach allows more depth in the findings. It was also seen as beneficial for the microfoundational exploration.

Table 9. *Influencing factors for motivation.*

Influencing Factors for Motivation	Weight
Money Rewards Money as a reward was a rather controversial topic. Quite many interviewees felt that money is a good motivator but quite many were somewhat against the idea, too. The ones who were more against the idea of money being the best motivator saw other encouragement methods and rewards as more suitable. Some interviewees also felt that money as a reward has shorter-term effects compared to other methods. Also, another interesting finding indicated that employees on the shop-floor recognized money as more effective motivator than middle or top managers.	++++
Other Rewarding Methods Quite many saw recognition, conversations, and overall support as important tools for motivating employees. Some foremen mentioned that overall feedback from superiors goes a long way in motivating employees. When employees feel they are being heard and valued, they were usually perceived to be more motivated.	++++
Internally Crowdsourced Digital Innovation Management Software The innovation management software was identified as a motivating factor. The software is easy to use, transparent, open, and it enables co-creation of ideas and feedback generation in a timely manner. The digital innovation management software and its consequent effects will be elaborated further in the section 4.6.	++++
Internal Communication Internal communication was recognized as highly beneficial in promoting innovation-oriented mindset, which in turn, motivates people to engage in innovative work behavior. One example of internal communication is celebrating the	+++

innovation related success.	
Foreman and Managerial Support This factor was partially present in the second factor "Other Rewarding Methods". Managerial support was recognized as important in promoting employee innovation. It was discussed that showing interest, empathy, and giving feedback were strongly associated with increased motivation. In addition, some top managers mentioned that the future way of leading includes servant leadership approaches. Consequently, they felt that foremen and managers should be trained to promote the desired outcomes through employees.	+++
Interesting Work and Tasks Interesting work and tasks were strongly related to motivation. The HR perspective emphasizes the importance of having suitable jobs for individuals. Since, work enjoyment is recognized to increase one's intrinsic motivation. Also, getting more responsibility and trust from foremen and managers were associated with increased levels of motivation.	+++
Cultural Aspects As mentioned before, a suitable cultural environment motivates employees to contribute to the overall organizational performance.	+++
Internal Support and Push The interviewees felt that various kinds of workshops and other innovation related activities are good approaches to motivate people. It was recognized that workshops could foster innovation-oriented behavior also after the specific event.	++
Experimenting and Implementing Ideas Interviewees saw that the implementation of innovative ideas increase the motivation of employees to engage in innovative work behavior. On the other hand, decrease in the implementation of ideas reduces the motivation to generate more ideas.	++
Resources Lack of resources affects both the idea generation and the implementation of ideas. It is well acknowledged that innovations need time and other resources.	+
Open Atmosphere This factor is related to the earlier mentioned cultural aspects. Open environment encourages employees to generate and announce improvement ideas and innovations.	+
Focused Innovation, Innovation Management Interviewees mentioned that usually people find it easier to ideate when they have a context and guidelines within to be creative, instead of pure brainstorming. Implementing innovation related goals were also seen as a possible source for increased motivation.	+

Freedom and Trust to Innovate As mentioned earlier, creativity and innovations need time. The employees should have the feeling that they are trusted to use their time to engage in innovative work behavior.	+
Psychological Safety People need to feel that they are allowed and expected to ideate and voice their ideas. The way ideas are embraced influences individual's willingness to present ideas in the future. For example, the researcher observed that one interviewee had been greatly influenced by supervisor's negative attitude towards innovation. Even though, this interviewee could otherwise be described as highly innovation-oriented person.	+
Collaboration The individuals' ability to combine and integrate knowledge with the knowledge of others is important. Moreover, appropriate level of collaboration motivates employees to ideate together in various kinds of knowledge creation contexts.	+
Diffusion of Negative Attitude In addition to psychological safety, the interviewees emphasized the drastic effects of negative attitudes and the diffusion of such attitudes within the organization. Negative influence was observed to have long-lasting and hard to repair impact on people. Negative influence could origin, for example, from a colleague or a supervisor.	- -

In addition to the Table 9, which introduced the influencing factors for motivation, some additional remarks from the interviews are presented in the concluding paragraphs of this subchapter. These remarks contemplate on how to influence, empower, and utilize employee innovation. One highlighted factor was facilitating innovation workshops within the organization, with the R&D department, and, also, with external partners. Related to this, it was widely recognized that cross-functional collaboration fosters innovation. In addition, factors that facilitate experience-based learning were also emphasized. Some of the mentioned approaches were job rotations, short-term assignments, and job shadowing. Additionally, gaining some experience abroad was considered a way to broaden one's worldview. Furthermore, organizational learning was recognized as an important way to facilitate process innovation related capabilities. Some of the interviewees felt that in today's world employees should take responsibility to increase their own learning. However, it was agreed that the environment needs to support employees to take initiative.

As clarified, the case organization and the closely located R&D-department comprise the subsidiary of the MNC. From the case organizations point of view, the MNC provides numerous opportunities for fostering process innovation capabilities. These opportunities include, for example, the access to comprehensive amount of knowledge that can contribute, for example, to knowledge integration. The opportunities that lie beneath the close collaboration within the MNC are established as being high importance. To conclude, the last additional remark emphasizes the possibilities related to fostering mentor-student relationships. To note, despite the importance of the relationship and possibilities within the MNC, these factors will not be discussed in more detail. Instead, the focus will be kept at the case organization.

4.5 Features of the Organizational Culture and Climate

This subchapter presents more detailed empirical findings related to the culture and climate in the case organization. Firstly, the overall antecedents of process innovation capabilities in the Section 4.2 revealed that the highest weighing factor is culture. Moreover, when the interviewees were asked to name areas they felt the organization was strong in, the three most principal factors were collaboration, open atmosphere, and low hierarchy. In addition, culture that supports innovation and development was also seen as one of the strengths, yet the three above mentioned factors of culture were perceived as stronger. However, collaboration, open atmosphere, and low hierarchy could also be said to be components of the innovation culture. Altogether, it can be stated that the organization recognizes culture and some culture related aspects the most fundamental factors for facilitating process innovation capabilities. These are presented in the Table 10 below. However, it should be kept in mind that these are collective outcomes that origin at the individual-level. The topic will be discussed in more detail in the Chapter 5.

The Table 10 has been constructed similarly as the previous tables. The demonstrated weights in the table indicate the relational weight of a factor within the population of factors. The population of factors stands for the factors within a certain topic or table. The weight is determined by how many interviewees were perceived to mention the particular factor. The orientations of the weights are presented either as positive (+) or negative (-) up to five units. In other words, it is a qualitative ranking system for the established factors. However, as mentioned earlier, the weights of the factors provide merely a direction on which were mentioned the most. The weights should not be given as much importance as the broad qualitative data itself. To add, the Table 10 diversifies some factors that could have been linked to broader or more collective concepts. However, a decision was made that this approach allows more depth in the findings. It was also seen as beneficial for the microfoundational exploration.

Table 10. *The weight of the cultural components in the case organization.*

Innovation Culture Related Strengths	Weight
Collaboration (4) Collaboration capabilities within the organization.	++++
Open Atmosphere (8) Open atmosphere can be identified to be related to the overall culture. Furthermore, open atmosphere was recognized as a contributing factor for the whole innovation process from idea generation to idea implementation. Honesty was mentioned in this context as well.	+++
Low Hierarchy (9) Low hierarchy, as the perceived hierarchy of the organization, reflects, for example, how effortless it is for the individuals within the organization to collaborate with each other. In the case organization, it was commonly acknowledged that the hierarchy is low and, thus, people are perceived as open and eager to communicate their ideas in various knowledge sharing contexts. This can contribute to the feeling of psychological safety as well.	++

Innovation Culture (1)	
Culture that supports innovation and development. Integral parts are experimentation and continuous renewal.	+

Other discussions regarding the organization's culture provided additional insight into the topic. Many interviewees felt that the organizational culture was supportive of process innovation and, furthermore, that there was a goal to advance the innovation culture even further. In addition, various interviewees felt that in recent years there had been a shift towards more innovation-oriented culture. However, the industry itself was recognized as having a negative impact on the innovation culture. Pharmaceutical industry is highly regulated and some changes, for example, to manufacturing processes could result in complex and time-consuming additional work. However, despite the regulations, a substantial portion of the interviewees saw that sometimes the mere existence of these regulations affects the mindset more than the actual regulations. In addition, regulations were perceived to contribute to the lack of experimentation and courage. In a sense, the stabile old way of operating could be perceived as comforting compared to vast changes and possible additional questions from the authorities.

One of the most interesting findings indicated that the implementation and promotion of internally crowdsourced innovation management software had advanced the innovation-oriented culture of the organization. As has been present in the earlier findings, the software was perceived to empower employees and encourage them to participate in knowledge generation and integration. According to these findings, the software has multilayered positive effects on the process innovation capabilities of the organization. Another emphasized result was time and perceived time pressure, which can both act as enablers or hindrances. Some of the interviewees mentioned "the Google way" and perceived it as enabling innovative work behavior. In addition, perhaps quite evidently, the role of leadership in shaping culture was also highlighted. Since the organization is aware of the profound influence of leaders and managers, they have already taken measures to improve these aspects. To remind, in the ranking of overall enablers of process innovation capabilities in the Table 6, dynamic leadership was ranked 6th and innovation management as 7th.

4.6 Effects of Digitalization on Process Innovation Capabilities

The third research question of this thesis was to explore how the internally crowdsourced innovation management software has influenced individuals' innovative behavior. This section provides insight into the identified effects and attribute-effect linkages related to the software. The results presented in this subchapter will be discussed further in the Subchapter 5.3.

The Table 11 summarizes the identified factors or linkages that were identified during the interviews. To note, the table has been constructed similarly as the previous tables. The demonstrated weights in the table indicate the relational weight of a factor within the population of factors. The population of factors stands for the factors within a certain topic or table. The weight is determined by how many interviewees were perceived to mention the particular factor. The orientations of the weights are presented either as positive (+) or negative (-) up to five units. In other words, it is a qualitative ranking system for the established factors. However, as mentioned earlier, the weights of the factors provide merely a direction on which were mentioned the most. The weights should not be given as much importance as the broad qualitative data itself. To add, the table 11 diversifies some factors that could have been linked to broader or more collective concepts. However, a decision was made that this approach allows more depth in the findings. It was also seen as beneficial for the microfoundational exploration.

Table 11. *Effects of innovation management software on process innovation capabilities.*

Digital Innovation Software Effects on Process Innovation Capabilities	Weight
Idea Generation and Implementation of Innovation Since the implementation of the digital innovation management software, the number of new ideas, accepted ideas, and implemented innovations have increased tremendously.	++++
Open System The interviewees identified the openness of the software as an important characteristic. Openness enables everyone in the organization to contribute to idea generation, co-creation, and implementation.	++++
Transparent The software is transparent. For example, employees can track the current status and comment-section of any idea of their choosing. In addition, they can also see the next pending tasks for all ideas.	+++
Low Barrier to Contribute Low barrier to contribute can be recognized as an important way to motivate and empower employees to engage in innovative work behavior.	+++
Motivates and Inspires The interviewees felt that the software motivates and inspires employees in numerous ways. For example, one can use the software to share inspirational content or to start a challenge to solve a specific problem.	+++

Co-creation of Ideas The software connects every employee with all the ideas within the system. This enables, for example, the co-creation of new ideas and advancing the existing ones.	++
Digital Tracking / Implementation Management As the software connects every employee with all the ideas within the system, it simultaneously enables and supports the testing and implementation of ideas and, in addition, the communication during these phases.	++
User-friendly The interviewees identified the user-friendliness as a key factor to be able to sell the software and its usage to employees.	++
Knowledge Management A lot of the knowledge in organizations is tacit and, therefore, the additional value of the software lies in its ability to transform tacit knowledge into explicit knowledge. Explicit knowledge can be, for example, more easily applied by others later and, thus, provides long-term benefits.	+
Rewards As mentioned in the Subchapter 4.4, which concentrates on individual perspective on process innovation capabilities, rewards were recognized as one of the most effective factors for motivating employees. In this case, the software has inbuilt rewarding system and, thus, it communicates the possibility of reward.	+
Empowers Employees A few interviewees mentioned that the software "gives a voice to the employees." In addition, it is motivating to experience one's ideas going forward and making a change. This among other things can provide the feeling of empowerment and, thus, contribute to individuals' motivational factors.	+
Fosters Collaboration and Innovative Work Behavior Partially related to some of the above-mentioned factors. During the interviews, it became obvious that the software fosters cross-functional collaboration and innovative work behavior.	+
Changes Culture The software messages the importance of innovation and encourages everyone to contribute to innovation related activities. The innovation management software has become organization wide tool, which is used at all levels of the organization.	+

5. DISCUSSION

The main goal of this thesis was to explore the underlying microfoundations of process innovation capabilities of a multinational corporation's Supply Center. To specify, the focus was on process innovations in the pharmaceutical manufacturing environment. Secondly, as an integral part, this research aimed to explore the underlying mechanisms, which affect individuals' innovative behavior. Thirdly, the research aimed to explain how an internally crowdsourced innovation management software has influenced individuals' innovative behavior. This chapter focuses on building the discussion on the empirical interview findings by utilizing the initial conceptual framework and other relevant theory that was discussed during the Chapter 2. To summarize, first, the explored and identified antecedents of process innovation capabilities are discussed. Next, in order to gain understanding of the micro-level, the focus shifts to innovative work behavior. Finally, the last subchapter discusses the innovation management software and its influence on innovative work behavior. To conclude, considering the main aim of this thesis, the final identified microfoundations of process innovation capabilities are summarized in the Subchapter 6.2.

5.1 Microfoundations of Process Innovation Capabilities

The next Figure 23 presents the linkages between the macro- and the micro-levels from the process innovation perspective applied in this thesis. During the discussion, the conceptualization presented in the Figure 23 will be utilized together with the created conceptual framework for process innovation capabilities. The initial version of the conceptual framework was presented in the Section 2.2.3 and the finalized version with additions will be presented in this Subchapter 5.1.

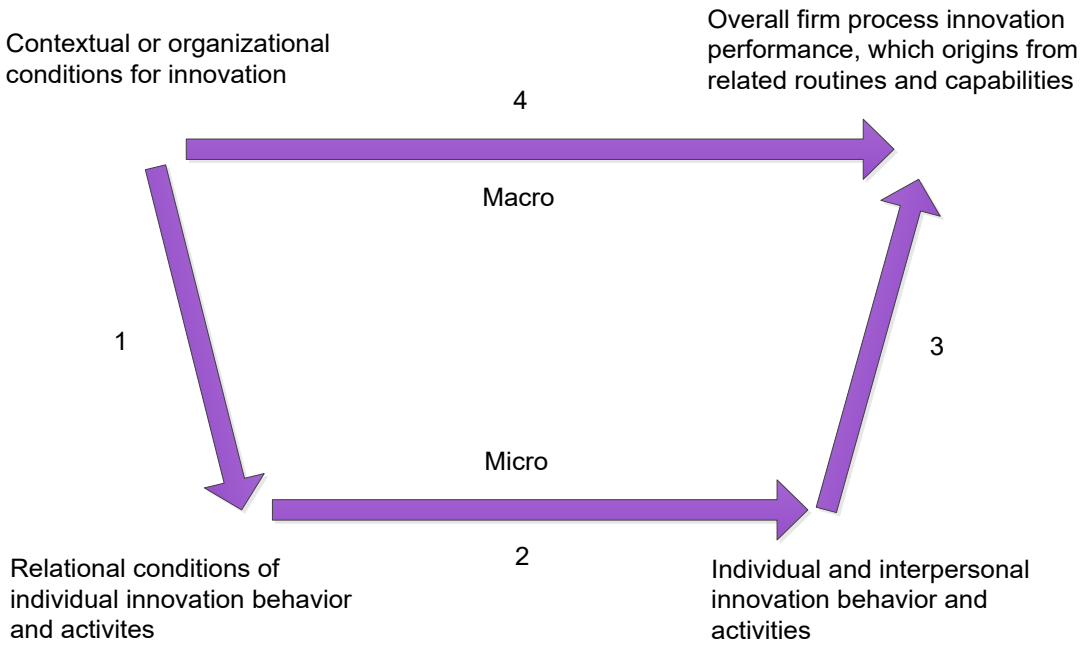

Figure 23. *Linkages between the macro- and the micro-levels from process innovation perspective (adapted from Coleman 1990 as cited in Foss 2009; Felin et al. 2015; Mäkelä et al. 2012).*

Overall, this subchapter can be summarized as giving insight into the 3 first arrows of the Figure 23. The arrow 1 illustrates the effects of organizational context and the arrow 2 the relational context of the individual. The arrow 3, on the other hand, summarizes individual and interpersonal innovation behavior and activities as collective outcomes. In this case, the emergent phenomena are interpreted as the process innovation capabilities, which affect the overall firm process innovation performance.

The next Figure 24 summarizes the key empirical findings presented in the Subchapter 4.2. To clarify, the figure presents results from the Table 6, which introduces the identified enablers and hindrances for process innovation capabilities. In other words, the results demonstrate the explained arrows 1, 2, and 3. However, the figure does not contain some of the more detailed information about the individual-level findings, such as individual attributes or motivational factors. These will be presented and discussed in more detail in the next Subchapter 5.2. To note, the final identified microfoundations for process innovation capabilities will be presented in the Subchapter 6.2, which integrates the overall empirical results in the Chapter 4 and the discussion in this Chapter 5.

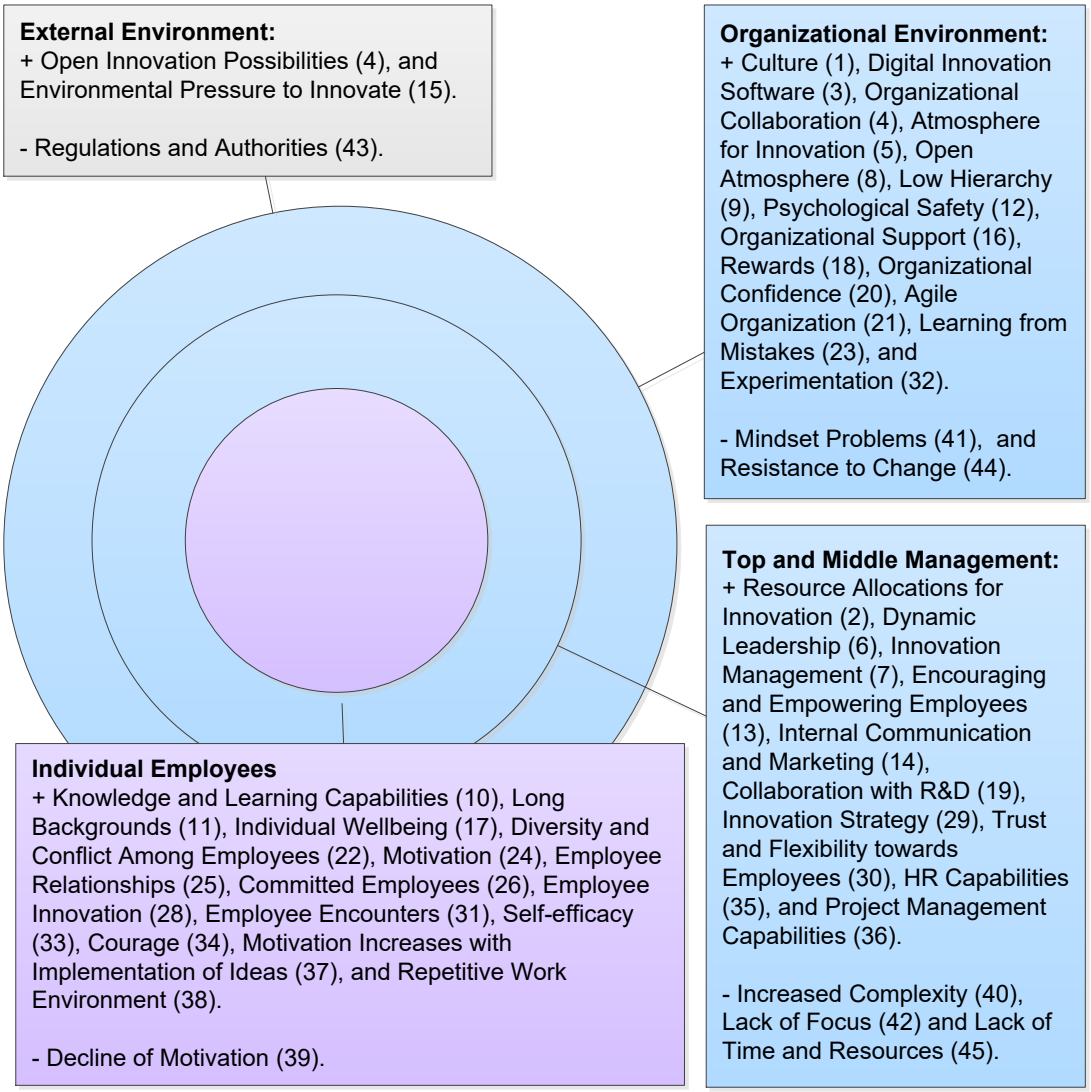

Figure 24. *Overview of the enablers and hindrances of process innovation capabilities.*

As mentioned, the Figure 24 presents the overview of the results from the Table 6. The results presented in the box of individual employees are mostly factors that could be linked with the arrow 2, since these factors present the attributes and factors related to the individual-level. The organizational environment and the top and middle management boxes can be interpreted as active or passive factors related to the arrow 1, which presents the organizational conditions for innovation. Moreover, management practices can be recognized as active attempts to influence the individual employee on the lower organizational level. However, managers are naturally also individuals with separate set of abilities, characteristics, and psychological foundations, which influence, for example, manager-subordinate relationships. Therefore, yet again, it should be stated that these categorizations are not explicit.

The box for external environment does not have its own representative arrow in the Figure 23, but it does influence the overall organization in numerous ways as discussed in the Subchapter 2.3. The next Figure 25 illustrates the conceptual framework for process innovation capabilities. In this figure, there are few additions to the previous version of the framework, which was illustrated in the Section 2.2.3. This final version of the conceptual framework is drawn from the interplay of extant theory and empirical findings.

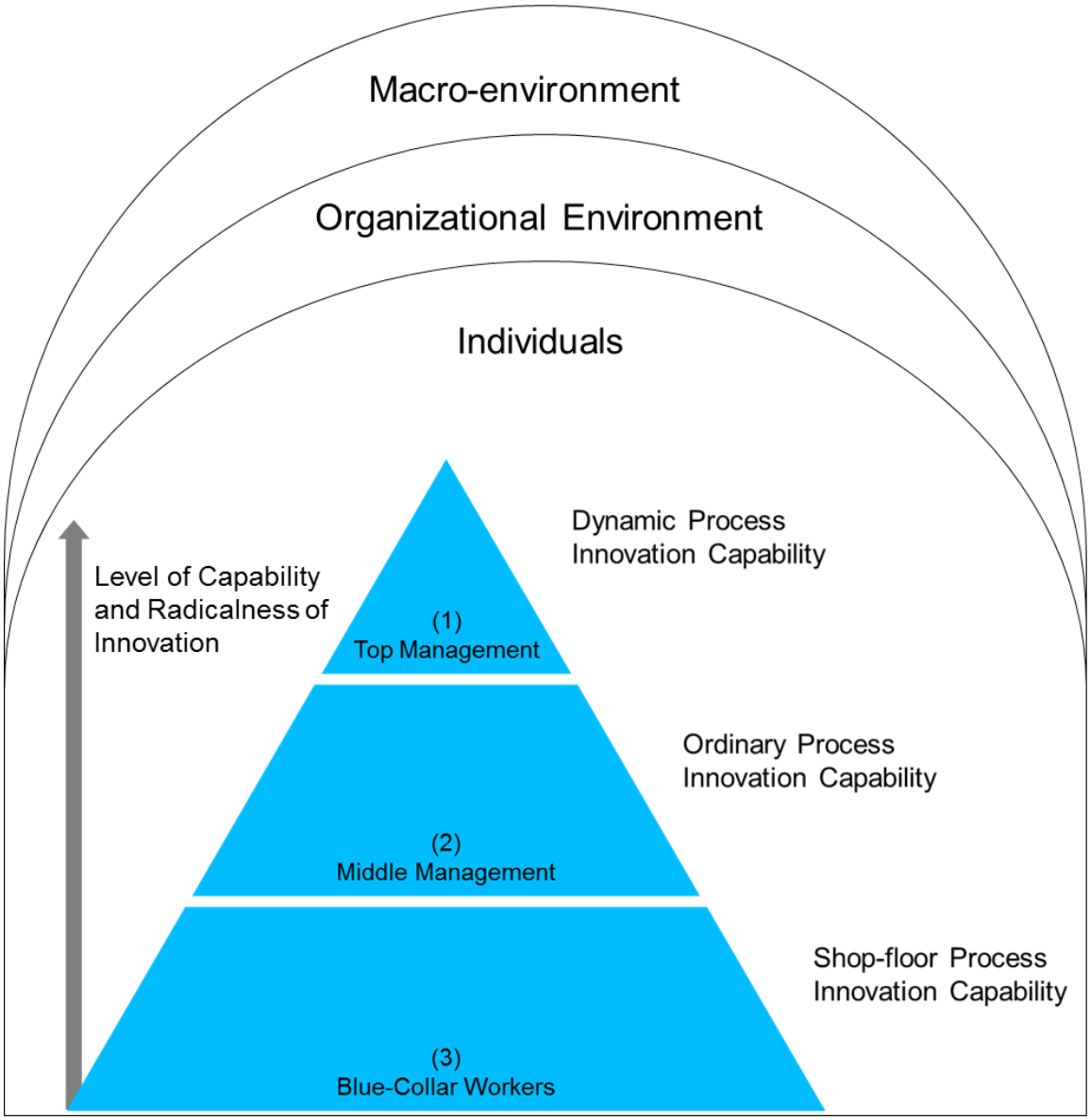

Figure 25. *Process innovation capabilities and contextual relationships.*

The illustration in the Figure 25 emphasizes the existence of additional contextual levels that influence the capabilities and their microfoundations. The contextual levels are depicted as the organizational environment and the macro-environment. The organizational environment includes, for example, the culture of the organization. The macro-environment, on the other hand, includes, for example, the industry and the political surroundings of the organization. To clarify the hierarchy of the capabilities within the organization, presented as blue in the figure, the Table 12 presents detailed examples for the conceptual framework. The table is presented to provide guidance for interpreting the discussion after the table.

Table 12. *Detailed examples for the components of the conceptual framework.*

Who	**Top Management**
Process Innovation Capability (PIC)	Dynamic PIC
Categories for Underlying Capabilities	Highest-level capabilities: sensing, seizing, and reconfiguring capabilities
Concrete Examples of Capabilities	Sensing and seizing radical process innovations; process innovation strategy formulation
Microfoundational Categories	Individuals, social processes, and interactions and structures
Concrete Examples of Microfoundations	Top management's cognitive abilities: e.g. sensing and seizing opportunities; resource allocations for innovation activities
Who	**Middle Management**
Process Innovation Capability (PIC)	Ordinary PIC
Categories for Underlying Capabilities	Higher-level capabilities
Concrete Examples of Capabilities	Process innovation management
Microfoundational Categories	Individuals, social processes and interaction, and structures
Concrete Examples of Microfoundations	Social processes and interaction, informal coordination: empowering, encouraging, and motivating employees e.g. towards continuous innovation
Who	**E.g. Blue-Collar Employees**
Process Innovation Capability (PIC)	Shop-floor PIC
Categories for Underlying Capabilities	Routines and lower-level capabilities
Concrete Examples of Capabilities	Shop-floor innovation, innovative work behavior, and continuous improvement
Microfoundational Categories	Individuals, social processes and interactions, and structures
Concrete Examples of Microfoundations	Individual characteristics, abilities, and behavioral and psychological foundations, for example, knowledge, experience, and emotions

Next, we will discuss the identified enablers and hindrances for process innovation capabilities with the conceptual framework and the microfoundational focus in mind. It should be noted, that the identified enablers for process innovation capabilities in the Table 6 or Figure 24 are not all recognized as microfoundations. Therefore, the next paragraphs will focus on sharpening the findings from the microfoundational point of view. A highly important thing to note is that even though the microfoundational discussion is not new, scholars are still struggling to reach a consensus of what microfoundations really are and are not (e.g. Felin & Foss 2005; Foss 2009; Felin *et al.* 2012; Foss *et al*. 2012; Barney & Felin 2013; Foss & Lindenberg 2013; Winter 2013; Felin *et* al. 2015; Foss & Pedersen 2016). The function of the earlier discussed categorization is to provide guidance for interpreting the microfoundations. However, providing a specific categorization for the identified microfoundations is beyond the scope of this thesis, considering the contested nature of the microfoundational approach itself.

The identified macro-environment related enabling or supporting factors are open innovation possibilities and environmental pressure to innovate. The identified hindering factors are regulations and authorities. These are all factors that influence the whole conceptual framework, but

the factors are not perceived as microfoundations. The concept of microfoundations has been elaborated and discussed in the Subchapter 2.1, and they can be summarized into three overarching categories: individuals, social processes and interaction, and structure (Felin *et al.* 2012). Furthermore, Barney and Felin (2013, p. 144) mention that the goal of "microfoundations program" is to reveal the origins and evolutions of microfoundations by examining how they emerge due to individual choices and social interaction. Instead, these identified macro-environmental factors influence the microfoundations underneath routines and capabilities within the organization. However, in another context, actual open innovation activities could be perceived as microfoundations. In this case, the factor represents only the existence of such possibilities.

As with the recognized macro-environmental factors, the identified factors related to the organizational environment can be recognized as factors that influence the whole organization and the emergence of process innovation capabilities. Most of the identified organizational factors can be recognized as collective constructs, which emerge through the interaction of individuals. As has been discussed, Foss (2009, p. 20) mentions that one does not need to approve to "hard-core methodological individualism" to accept that collective concepts in social science should have microfoundations, that we lack mechanisms to directly link macro-variables, and that links between those variables should acknowledge the role of micro-variables such as individual actions and interactions (see also Felin & Foss 2005). In addition, Barney and Felin (2013, p. 141) mention that individual interactions are complex, and they can lead to unexpected aggregate and emergent outcomes. Furthermore, Barney and Felin (2013, p. 141) emphasize that reducing, or trying to reduce, everything to individuals is only "micro" – not "microfoundational". Therefore, considering the recognized additive, collective, and emergent outcomes, we can yet again state that microfoundations are not solely about individuals (e.g. Felin & Foss 2005; Foss 2009; Barney & Felin 2013; Felin *et al*. 2015). Thus, some of the collective organizational level factors can also be perceived as microfoundational. Various organizational factors in this case are aggregate constructs of individual behavior.

As presented in the Figure 23, the organizational conditions for innovation influence individuals and, thus, the micro-level. Some of the positive organizational factors are culture, organizational collaboration, atmosphere for innovation, open atmosphere, low hierarchy, psychological safety, organizational support, organizational confidence, agile organization, learning from mistakes, and experimentation. The negative organizational conditions were identified as mindset problems and resistance to change. All the above factors, enablers and hindrances, influence the lower level of the organization as depicted with the arrow 1 in the Figure 23. Culture and atmosphere supportive of innovation, despite being collective macro-level phenomena, are strongly linked to the development of process innovation capabilities. Other key factors are low hierarchy, collaboration, psychological safety, and organizational support. These could also be recognized as components of successful innovation culture. However, as mentioned, the researcher of this thesis has announced to focus more on the individual-level. Therefore, the above organizational factors will not be analyzed further.

However, one important organizational factor that was not mentioned above is the internally crowdsourced innovation management software that has been operating within the organization since 2016. The utilization of the digital innovation management software has various positive and supportive effects on process innovation capabilities. Considering the microfoundational categories presented by Felin *et al.* (2012), the software could be recognized as belonging to the social processes and interaction category. To clarify, the innovation management software can be recognized as a technology, which people utilize to interact and manage in the context

of innovations. This microfoundation and its influence will be discussed in more detail in the Subchapter 5.3.

Top and middle management related microfoundations

The next group of factors in the Figure 24 is top and middle management. Considering the Figure 25, hierarchy-wise these factors can be conceptualized as locating at the top two levels. Some of the factors could have been merged, but in the nature of microfoundational exploration, the more detailed level was sustained. First, the second most important recognized enabler, after culture, was resource allocations for innovation. These kinds of decisions are typically made at the level of top and middle management and they can be recognized as linked to the factors of innovation management and innovation strategy. To summarize, strategic planning of innovation and the consequent influence on, for example, resources, are important for fostering process innovation capabilities. In this case, the factors are merged into strategic process innovation management activities with an emphasis on sufficient resource allocations and goals to enable innovations. This microfoundation can be acknowledged to belong to the category of social processes and interaction. Within that category, this microfoundation is strongly related to methods of coordination and integration. Moreover, formal coordination can indicate rules and standard operating procedures, whereas informal coordination experience, norms, and values (Felin *et al.* 2012).

To note, the earlier distinguished microfoundation of innovation management software strongly supports the latter microfoundation of strategic innovation management with an emphasis on sufficient resource allocation and goals. Furthermore, the identified hindrances can be said to support the importance of this microfoundation, since lack of focus, increased complexity, and lack of time and resources could be avoided with successful strategic process innovation management. Moreover, the empirical results also highlighted the need for dynamic leadership. In this context, the interviewees underlined the sensing and seizing capabilities of top management. This is also supported by the extant literature, where important managerial-level activities are recognized as semi-continuous asset orchestration and corporate renewal (Teece 2007, p. 13350, 2012, 2014; Teece & Leih 2016). Moreover, since top management leadership skills are required to sustain dynamic capabilities, there is a strong emphasis on entrepreneurial management skills (Teece 2007, p. 1335, 2012, 2014; Teece & Leih 2016). To summarize, one microfoundation for process innovation capabilities can be recognized as dynamic and entrepreneurial leadership with sensing, seizing, and reconfiguring capabilities. This microfoundation relies heavily on individual managers and their abilities, characteristics, and behavioral and psychological foundations.

Another important finding was the significance of the collaboration with the R&D-department. The interviewees recognized various possible benefits for being simultaneously in the developmental forefronts of product innovation and process innovation activities. Process innovations were recognized as something to be pursued together with the new product development process. This can be recognized as one of the most important microfoundations of process innovation capabilities. A more descriptive definition of the microfoundation is integrating process innovation related activities with new product development activities to sense and seize opportunities at the right time.

Other identified factors for stimulating individual and interpersonal innovative behavior and activities were encouraging and empowering employees, internal communication and marketing, trust and flexibility towards employees, and, also, rewards. All these management related fac-

tors can be recognized as activities, which aim at increasing individual innovative work behavior (Amabile 1997; Janssen 2000, 2005). These factors are strongly linked with the arrow 2 in the Figure 23. To clarify, management behavior, attitude, and activities aimed at encouraging and empowering employees, such as, supportive internal communication, rewards, and trust, can be recognized as a microfoundation for process innovation capabilities. This kind of microfoundation stimulates employees within the whole organization. Fostering high-involvement innovation contributes simultaneously to improving capabilities related to continuous improvement or innovation (CI).

Earlier, in the Subchapter 2.2.3, the relationship between CI capabilities and process innovation capabilities was discussed. To remind, first of all, the CI capabilities have been recognized to evolve in a hierarchy, too. This is demonstrated in the Table 3. The lower-level CI routine or capability could be interpreted, for example, as microfoundation or parallel and integrated capability for the distinct levels of process innovation capabilities. Full CI capability, on the other hand, could be interpreted as an example of dynamic capability (Bessant & Caffyn 1997). Therefore, the full CI capability, in other words the learning organization, could be an integrated microfoundational or parallel building block for dynamic process innovation capability. To add, the potential for involving employees directly at strategical or higher levels has not been adequately exploited, partially due to lack of sufficient tools (Tonnessen 2005, p. 196). The question whether digitalization provides sufficient tools by simultaneously benefitting the emergence of different level process innovation capabilities is discussed in the Subchapter 5.3. Moreover, it is obvious that organizations need to increase their innovative capacity and capabilities and one way for achieving this is to extend participation in the process to a wider population (Bessant & Caffyn 1997).

The two factors yet to be described in the management related box are HR capabilities and project management capabilities. Important HR capabilities, according to the interviewees in this context, were strongly related to recruiting and employee wellbeing. It was acknowledged by the interviewees that specific individuals can have a major impact on the organization's performance and, therefore, the organization should aim at hiring the best talent possible. Furthermore, relational stars might have the ability to transform others to be more effective at knowledge recombination (Grigoriou & Rothaermel 2014). In addition, it was recognized that individuals need to be in the right job and wellbeing to be motivated. Thus, HR capabilities are an important microfoundation of process innovation capabilities from various perspectives. To clarify, HR capabilities with an emphasis on recruiting stars and keeping them satisfied and wellbeing is an important microfoundation for process innovation capabilities. To conclude the managerial part, also project management capabilities were recognized as important, for example, for implementing more radical innovations. Thus, project management capabilities were recognized as a microfoundation for process innovation capabilities.

Individual-level related microfoundations

So far, we have discussed the different level environmental and top and middle management related factors. Next, we will focus on the individual employee. During the interviews, there were various aspects that were recognized as enablers for process innovation capabilities. These are knowledge and learning capabilities, long backgrounds, individual wellbeing, diversity and conflict among employees, motivation, employee relationships, committed employees, employee innovation, employee encounters, self-efficacy, courage, motivation that increases with idea implementation, and repetitive work environment. Next, these enablers are combined with some of the empirical results presented in the Subchapter 4.4, which illustrates the empirical findings

on individual perspective on process innovation capabilities. The factors to be discussed are open and development-oriented; problem solving -oriented; experimentation-oriented; questioning the status quo; courage and bravery; ambitious and driven; positive, excited and passionate; social intelligence and collaboration; slightly carefree; self-efficacy; new and young employees; persistency; and sensing and seizing abilities. As can be noticed, some of the factors are highly similar and entwined. Next, these will be sorted into more manageable groups.

The most important individual-level microfoundations are expertise as in knowledge combined with experience, creativity skills as in cognitive abilities combined with individual creativity, and task motivation as in curiosity combined with other sources of motivation. These microfoundations combine both the abilities and characteristics of individuals. Other important microfoundations are social intelligence as in individual's relational ability to engage or interact with other individuals, and individual's sensing and seizing abilities. Moreover, the combination of passion, courage, ambition, and slightly care-free attitude can also be recognized as individual-level microfoundations, and they could be categorized into individual's characteristics or behavioral and psychological foundations. Related to these factors are such characteristics as open and development-oriented, problem solving -oriented, and experimentation-oriented. Moreover, an innovative person was identified as someone who is not too afraid of conflicts. This statement is supported with two identified factors: questioning the status quo and sufficient amount of conflict among employees to foster idea generation. To conclude, the relationships between employees and the number of encounters they have regarding innovation creation context can also be recognized as microfoundations for process innovation capabilities.

Furthermore, to summarize some theory, the dynamic capabilities approach acknowledges that activities focused on generating, acquiring, integrating, and disseminating knowledge integrate into the firm's fundamental ability to develop and implement process innovations (e.g. Teece 2007; Piening & Salge 2015). In addition to the presented empirical interview results, the researcher has knowledge of numerous supporting activities within the case organization, which contribute to the development and implementation of process innovations. For example, the case organization has developed routines and capabilities, which involve daily performance dialogues, gemba-walks with different agendas, and standardized systematic problem-solving workshops. These can be recognized as individually and collectively performed microfoundations for process innovation capabilities, since they contribute to generating, acquiring, and integrating knowledge. In a sense, these can also be recognized as different contexts for knowledge creation (Nonaka 2000).

More in-depth analysis of individual-level findings will be discussed in the next Subchapter 5.2. To conclude, this subchapter presents the conceptual framework for different level process innovation capabilities, which aids in recognizing the underlying microfoundations. In addition, this chapter provides an overview of some of the identified microfoundations for the process innovation capabilities in the case organization. To conclude, considering the main aim of this thesis the final identified microfoundations of process innovation capabilities are summarized in the Subchapter 6.2 of Main Findings. These final findings are drawn from the discussions presented in this Chapter 5.

5.2 Fostering Innovative Work Behavior

The second research question of this thesis was to explore the underlying individual mechanisms to innovate. In practice the results reveal how to encourage and motivate employee’s innovative behavior. The specific empirical interview findings are presented in the Subchapter

4.4. To elaborate, the main focus of this subchapter is on individual attributes, overall motivational factors, and some cultural aspects related to motivation, innovative behavior, and the innovation context. The below Figure 26 summarizes interview results for motivational factors and individual attributes that are related to innovative work behavior. Furthermore, the figure presents organizational factors for motivation and, also, relevant organizational culture related aspects from the Table 7. These are presented under the "additional cultural aspects" within the block of organizational factors. It should be noted that categorization of the findings is not explicit. Altogether, the figure emphasizes the interplay of the individual and contextual factors, which influence innovative behavior and the innovation context "Ba".

Figure 26. *Motivational factors and individual attributes related to innovative work behavior and innovation context.*

As discussed in the Section 2.1.1, this research has adopted an approach of methodological individualism, which perceives the individual as the fundamental component of, for example, social theories. To recap, from this point of view, individual's beliefs, preferences, and interests are appropriate foundation from which to build theories of how social structures emerge and evolve. The fundamental notion is that in order to understand a collective phenomenon, we need to understand the elemental components: individuals and their social interaction. Furthermore, earlier, firm-level research has been central in helping us understand the origins of competitive advantage, but the next step is to decompose these aggregates to properly understand

how organizational factors and advantages emerge. However, when discussing microfoundations, it should be noted that they are not solely about individuals. (e.g. Felin & Foss 2005; Foss 2009; Teece 2007; Felin *et al.* 2012; Foss *et al.* 2012; Barney & Felin 2013; Winter 2013; Felin *et al.* 2015; Foss & Pedersen 2016)

In the beginning of this chapter, the Figure 23 demonstrated the conceptualization for the linkages between micro- and macro-levels. The results in the Figure 26 combine both, the arrow 1 and the arrow 2. To remind, the arrow 1 represents how the organizational-level contextual or organizational conditions influence the individual-level conditions. The arrow 2, on the other hand, represents how the individual-level relational conditions of individual innovation behavior and activities influence the actual individual and interpersonal innovation behavior and activities. In this case, the box with individual factors represents the contents of arrow 2 and the box with organizational factors the arrow 1. However, as mentioned, the categorizations are not explicit. The Figure 26 includes various aspects that are entwined. To combine the microfoundational literature and the conceptualization, the lower left corner in the Figure 23 can be recognized to consist of individuals' abilities, characteristics, and behavioral and psychological foundations (Felin *et al.* 2012). The right left corner, on the other hand, can be said to consist of diverse activities and outcomes of innovation behavior. These build up through the arrow 3 to form collective outcomes as routines and capabilities. Thus, the microfoundations lie in the both ends of the arrow 2.

To analyze the results further, the nature of the concept of innovation-oriented person within extant literature should be elaborated. As mentioned in the Chapter 2, Anderson and colleagues (2014) define creativity as the idea generation, whereas innovation refers more on the following phase of idea implementation to achieve better procedures, practices, or products (Anderson *et al.* 2014). Furthermore, according to IWB, there are distinct behavioral tasks that the innovator needs to accomplish: the idea generation, idea promotion, and idea realization (Janssen 2000, p. 288). Naturally, these different behavioral tasks require different set of characteristics, abilities, and behavioral and psychological foundations from the individual. In addition, previous literature has acknowledged that employee innovation emerges from the interaction of personal and contextual factors, such as individual characteristics, intrinsic job factors, group factors, relationships at work, and organizational factors, which either encourage or inhibit employee's innovation related activities (Janssen 2005). Other individual-level components are expertise, creative-thinking skill, and intrinsic motivation (Amabile 1997).

While analyzing the empirical results, the cognitive abilities of an individual were recognized as the most important attribute of innovation-oriented individuals. The interviewees felt that the knowledge generation and integration abilities are highly important. In addition, the interviewees saw that the more knowledge one has, the more possibilities for knowledge integration exists. Therefore, the attribute of cognitive abilities can also be linked with vast knowledge and backgrounds. Knowledge and experience can be recognized as inputs for the cognitive abilities. Furthermore, these terms can be linked with Amabile's (1997) componential theory of creativity, which emphasizes expertise, task motivation, and creativity skills. Cognitive abilities, combined with the empirically identified creativity attribute, could be interpreted as creativity skills, and vast knowledge and experience as expertise. If we combine this information with the enablers of process innovation capabilities, highly important individual-level microfoundations can be identified as the knowledge and experience and cognitive abilities such as learning and integration capabilities.

Another attribute related to cognitive abilities, previous knowledge, and experience is curiosity. It was recognized as the hunger for knowledge and, therefore, can also be interpreted as intrinsic motivation to learn. Furthermore, curiosity could be interpreted as a form of task motivation. Amabile's model focuses on creativity, which can be interpreted as the first stage of the innovation process. In addition to Amabile, extant literature has discussed the expected positive linkage between specialization and innovation, which indicates that a variety of specialists provide broader knowledge-base and increased cross-fertilization of ideas (Aiken & Hage 1971; Kimberly & Evanisko 1981 as cited in Damanpour 1991, p. 558). Also, expectedly, the greater the technical knowledge resources, the more easily innovative ideas are generated and implemented (Dewar & Dutton 1986 as cited in Damanpour 1991, p. 558) The following Figure 27 summarizes the similarities between empirical results and some of the attributes with Amabile's (1997) componential theory.

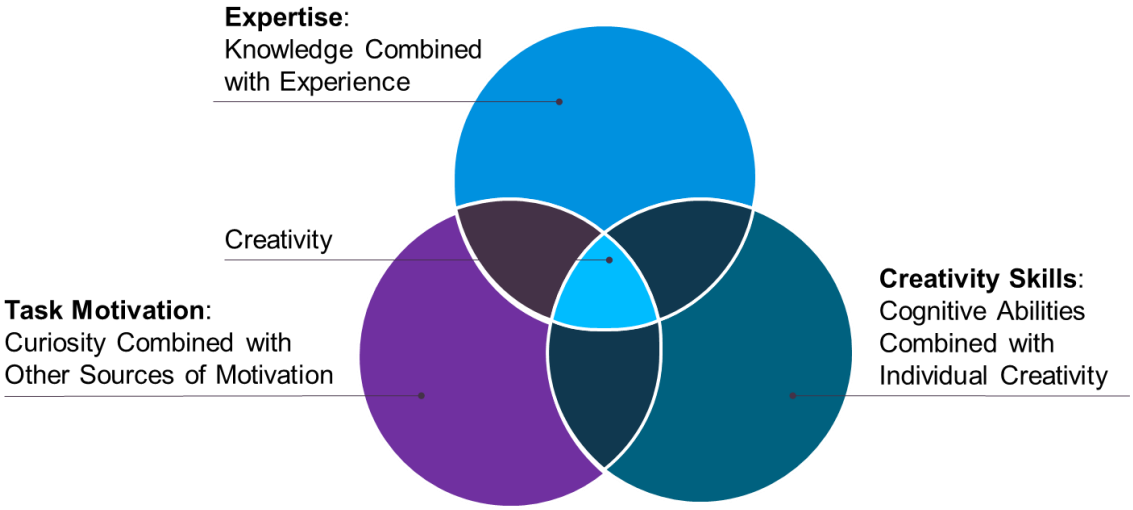

Figure 27. *Integrating results with Amabile's original componential theory of creativity (adapted from Amabile 1997).*

The factors presented in the Figure 27 can also be recognized as individual-level microfoundations for process innovation capabilities. Expertise as in knowledge combined with experience, creativity skills as in cognitive abilities combined with individual creativity, and task motivation as in curiosity combined with other sources of motivation. Other empirical findings related to the same idea generation context are: extrovert or introvert, questioning the status quo, open and development-oriented, problem solving-oriented, and experimentation-oriented. Some of the mentioned attributes could also be linked with Amabile's componential theory of creativity. However, these are not presented in the figure. Another mentioned attribute was the sensing ability, which is also present in Teece's (2007) theory. Sensing ability could also be recognized as the ability to see possibilities for ideation.

The next innovation phase of IWB focuses on the idea promotion (Janssen 2000, p. 288). As mentioned, the innovators are said to be attempting to break the institutionalized system of theories and practices and, therefore, this sociopolitical process can be expected to be resisted by organizational members, who are committed to the general established ways. Due to the resistance, it is crucial for the innovator to acquire friends, backers, and sponsors. (Janssen 2005) The empirical findings that can be interpreted as attributes related to the behavioral tasks of idea promotion are: courage and bravery; positivity, excitedness and passion; social intelligence and collaboration, and slightly care-free. Thus, the empirical findings can be interpreted as

agreeing with the extant literature. Furthermore, the last innovation phase of IWB focuses on idea realization (Janssen 2000, p. 288). This phase can be linked with attributes such as seizing ability, self-efficacy, persistency, and ambition and drive. To conclude, some of the empirical findings also suggest that anyone can become and innovator and that sometimes young and new people in the organization are better at sensing opportunities.

Next, motivation, one of the most principal factors, is discussed in more detail. The identified motivational factors included intrinsic and extrinsic motivation sources and combinations of thereof. Rewards, recognition, managerial support, and frequent constructive feedback were emphasized in the empirical results. These findings are congruent with the supports Amabile (1997) has identified. The author revealed some extrinsic motivators operating as supports for creativity. These are, for example, rewards and recognition for creative ideas, clearly defined goals for work, and frequent constructive feedback on the work. (Amabile 1997) An interesting empirical finding suggested that lower-level employees saw rewards as a useful source of motivation, whereas management saw softer approaches, like feedback, more valuable. In addition to the extrinsic motivation sources, also interesting work and tasks were recognized as important for motivation. This motivational factor can be recognized to be more intrinsic, which is driven by interest and involvement in the work, curiosity, enjoyment, or a personal sense of challenge (Amabile 1997). Interesting remark also highlights that to some extent, a high degree of intrinsic motivation can compensate for a deficiency in the other components, creativity skills, and expertise (Amabile 1997, p. 42). This was also recognized during the interviews.

In the extant literature, additional contextual components are organizational motivation to innovate, resources, such as finances, time and personnel, and managerial practices such as enabling challenging work and supervisory encouragement (Damanpour 1991; Oldham & Cummings 1996; Amabile 1997). The contextual factors related to motivation and innovation that were identified during the interviews included resources, such as finances, time and personnel, and managerial practices, such as innovation management practices, which make innovation related activities more focused and goal oriented. All these findings have been discussed in the extant literature. Resources were recognized empirically as especially crucial. In the extant literature slack resources have been expected to have a positive relationship to innovation, because they afford to purchase innovation, absorb possible failure, and explore new ideas in advance of actual need (Rosner 1968, p. 615 as cited in Damanpour 1991, p. 559). Thus, our empirical findings follow the line of previous work.

Other empirical findings that have been discussed in the literature are manager attitude towards change and administrative intensity. Damanpour (1991, p. 558–559) suggests that managers encouraging attitude toward change leads to an internal climate beneficial for innovation. This is seen as highly important in the implementation phase, due to the coordination and possible conflict resolution among individuals and units (Damanpour 1991, p. 558). Administrative intensity, on the other hand, is seen as beneficial for innovation, since it implies that a higher portion of managers facilitate innovation, which leads to successful adoption through leadership, support, and coordination from the managers (Daft & Becker 1978; Damanpour 1987 as cited in Damanpour 1991, p. 559). Furthermore, managerial support has been acknowledged even more important for incremental innovations, since they are most often introduced by middle or lower levels of the organization (Damanpour 1991, p. 581). Altogether, the empirical findings related to the importance of management practices and supports are congruent with the existing theories (e.g. Damanpour 1991; Oldham & Cummings 1996; Amabile 1997).

The Figure 28 presents another integration between the empirical findings and Amabile's (1997) theory of organizational factors for creativity and innovation. All the above-mentioned discussions can be summarized with the figure, since the overall discussion emphasized the importance of goal-oriented innovation management practices and support, organizational motivation, and resources.

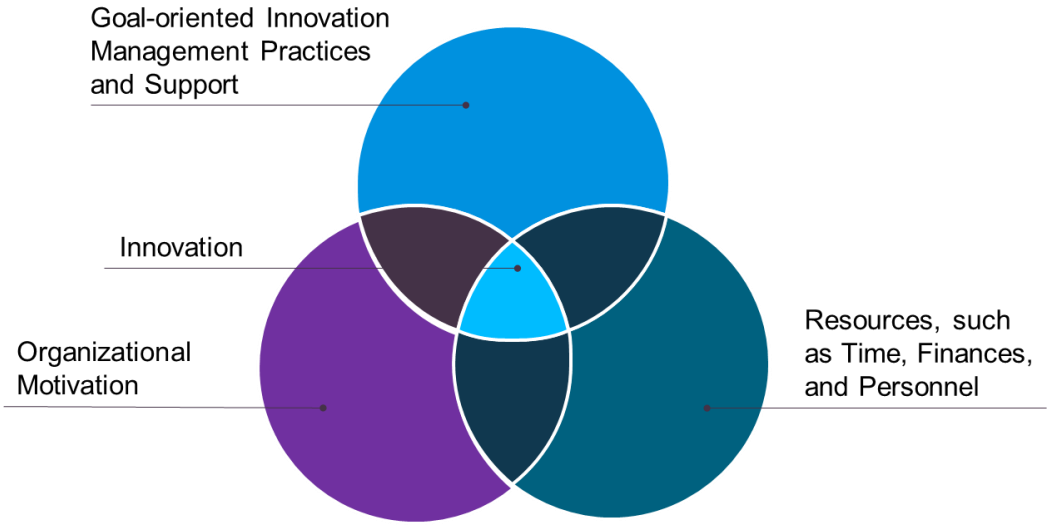

Figure 28. *Integrating results with Amabile's original theory of organizational factors for creativity and innovation (adapted from Amabile 1997).*

In addition, other motivational factors that were identified during the interviews were cultural factors, open atmosphere, freedom and trust to innovate, psychological safety, collaboration, and avoiding the diffusion of negative attitudes. To build on psychological safety and its value for process innovation, Baer and Frese (2003) have found that the relationship between process innovativeness and firm performance was enhanced by high levels of climate for personal initiative and psychological safety. To summarize, people need to feel like they are allowed to ideate and voice their ideas. The way new ideas are embraced influences the individual's willingness to present new ideas in the future. For example, the researcher observed that one interviewee had been greatly influenced by supervisor's negative attitude towards innovation. Even though, this interviewee could otherwise be described as highly innovation-oriented person. In addition, the interviewees saw that experimenting and implementing ideas was highly motivational. Bessant and colleagues (2004) have recognized that companies are also able to kill innovation cultures through a combination of short-term thinking, risk aversion, and top-down decision making. Thus, the innovative employees need to see things moving forward or their motivation will start to decrease. This was also emphasized during the interviews.

Furthermore, the Figure 26 included other organizational factors related to motivation, individual innovative work behavior, and innovation context, too. These are low hierarchy, innovation culture and atmosphere, organizational confidence, and agile organization. If we compare the finding of low hierarchy to extant literature, we find that it is congruent with extant literature, too. Flexibility and low emphasis on work rules have been recognized to facilitate innovation (Burns & Stalker 1961; Thompson 1965; Aiken & Hage 1971 as cited in Damanpour 1991, p. 558). Moreover, low formalization permits openness, which is seen as encouraging new ideas and behaviors (Pierce & Delbecq, 1977 as cited in Damanpour 1991, p. 558). These statements were recognized as congruent in the case organization's interviews.

Moreover, as mentioned, managerial attitude can be identified as linked to innovation culture and atmosphere (Damanpour 1991). This was also recognized as a facilitating factor for innova-

tion during the interviews. Furthermore, extant literature has recognized the positive influence of professionalism and innovation, which indicates that professionalism increases boundary spanning activity, self-confidence, and a commitment to move beyond the status quo (Pierce & Delbecq 1977 as cited in Damanpour 1991, p. 558). This can be acknowledged as linked to the identified factor of organizational confidence. Another organizational factor that was identified was related to the organization's agility, which has also been recognized as an enabler of the ability to recombine and to reconfigure assets and organizational structures to accompany the growth of the enterprise (Teece 2007, p. 1335). Thus, in other words, reconfiguring requires organizational agility and, therefore, is an enabler for innovation, too.

To conclude, in addition to the discussed individual and organizational factors, the case organization's context is also bound to the macro environment of the pharmaceutical industry (Van de Ven 1986; Damanpour 1991). Another interestingly high motivational aspect in the organization was the innovation management software, which will be discussed in more detail in the following Subchapter 5.3.

5.3 Towards Digitally Enabled Continuous Innovation

The second research question of this study was to explore how the internally crowdsourced innovation management software has influenced individuals' innovative behavior. This subchapter discusses the identified effects and attribute-effect linkages presented in the Subchapter 4.6. The software can be classified to the innovation management software (IMS) sub-category of computer-aided innovation (CAI). Before going into the detailed results, the software will be introduced.

The software is provided by Orchidea Innovations, which is a Nordic software company in the field of innovation management. The software, Orchidea, is marketed as collaborative software for co-development, prioritization, and implementation of innovation. It is also said to cover the innovation process all the way from idea generation to project and portfolio management. Therefore, the company promotes that the software enables the transformation of ideas into innovations easily and effectively. In addition, the company mentions that they aim to help their customers to involve employees, customers, and partners to innovation. The software has a lot of features, which include the above-mentioned idea generation with open continuous ideation and digital brainstorming. It is also easy to participate in idea co-development through social media -like interface, which is user-friendly and perceived as familiar by the users. The software also offers different kinds of analytics, for example, quantitative and qualitative evaluation of ideas. In addition to these features, Orchidea has inbuilt engagement possibilities like challenges. The challenges are different themed innovation challenges that aim to engage people in high involvement ideation. (Orchidea 2019)

The effects of the innovation management software were a central theme during the interviews. The identified effects and attribute-effect linkages were vast and versatile. The top results were the tremendously increased number of ideas and implemented innovations, and the characteristics of openness and transparency. The openness and transparency were recognized to enable the contribution of entire workforce to idea generation, co-creation, and implementation. In other words, the software empowers the whole organization. The engagement of the entire workforce to improvement programs has also been recognized as a beneficial characteristic in the previous research (Huesig & Enders 2019, p. 304). In addition, innovation management and employee suggestion systems and their relation to the field of CAI have been discussed (Chen *et al.* 2009). Furthermore, the decentralization of decision-making authority and the dispersion of

power have been recognized as a necessity for innovation (Thompson 1965 as cited in Damanpour 1991, p. 558). This is also present in the IMS, since the process has been designed to rely on topic owners, who are typically department managers or specialists within a certain function.

The software was also recognized to motivate, inspire, and encourage employees. This is due to various factors, which are, for example, low barrier to contribute and inbuilt rewarding system. Moreover, the software is acknowledged to give employees a voice at every level of the organization. These findings can be recognized to increase the number of new and co-created ideas. In addition, the software supports the sharing of inspirational content or initiating problem-solving challenges. Thus, the software has various inbuilt features, which can empower individuals. Furthermore, internal communication has also been recognized to facilitate the dispersion of ideas within an organization and to increase their amount and diversity, which results in cross-fertilization of ideas (Aiken & Hage 1971 as cited in Damanpour 1991, p. 559). In addition, internal communication facilitates an internal environment favorable for the survival of new ideas (Ross 1974 as cited in Damanpour 1991, p. 559). Furthermore, according to Nambisan (2003), IT supports collaboration, coordination, and communication among team members or enhances the base of knowledge available to the team. The empirical results also emphasized the knowledge management related effects.

A lot of the knowledge in organizations is tacit and, therefore, the additional value of the software is that it transforms some of the tacit knowledge into explicit knowledge. Explicit knowledge can be, for example, more easily applied by others later and, thus, provides long-term benefits. Another valuable characteristic enables the digital tracking or implementation of innovations. As the software connects every employee with every idea within the system it also enables transparent planning of the testing and implementation phase and the communication around these topics. Also, the previous innovation literature has acknowledged the participatory work environments facilitating innovation by increasing organizational members' awareness, commitment, and involvement (Damanpour 1991, p. 558). One empirical finding also emphasized that the software enhances cross-functional collaboration and individual's innovative behavior.

Probably related to all the above factors, the innovation management software was recognized as able to change the innovation culture. The IMS was implemented roughly two years ago, and during the conversations quite many interviewees mentioned that the innovation culture of the organization has evolved a lot during the past years. To summarize, the innovation management software can be recognized to have all-embracing positive effects on innovation activities. Since the core aim of this thesis was to explore the microfoundations of process innovation capabilities, the innovation management software can be identified as one of the microfoundations supporting the process innovation capabilities at all levels of the organization. Especially, at the lowest level introduced in the conceptual framework. To conclude, the innovation management software can be recognized as microfoundation for process innovation capabilities, since it can be acknowledged to support various important aspects that are crucial for the innovation activities as a whole. Most importantly, the innovation software can be stated to be supporting continuous improvement and innovation within the organization.

6. CONCLUSIONS

This chapter summarizes the results of this master's thesis. First, the chapter elaborates the themes of the contributions made by this thesis. Second, the chapter discusses the main findings of the research and analyzes how the findings relate to existing literature. Third, the reliability and validity of the research are discussed and evaluated. Fourth, the chapter presents the managerial implications identified during the research. Finally, this chapter ends with a discussion of possibilities for future research.

6.1 Contribution

This research sheds light on several topics that have been lacking insight in the extant literature. Firstly, the knowledge of process innovations and particularly the question of how firms become process innovators are still underdeveloped (Keupp *et al.* 2012; Piening & Salge 2015; Marzi *et al.* 2017). To elaborate, our understanding of the antecedents, contingencies, and effects of process innovations remains limited (Hervas-Oliver *et al.* 2014; Piening & Salge 2015). Furthermore, Keupp *et al*. (2012) and Piening and Salge (2015) have emphasized that particularly critical gap in the literature resides in the lack of insight into the organizational and managerial activities through which firms introduce process innovations.

In addition, the research field of capabilities has remained surprisingly uninterested about process innovations (Woiceshyn & Daellenbach, 2005), even though process renewal or innovation is by definition the fundamental function of dynamic capabilities (Zollo & Winter 2002; Piening & Salge 2015). Instead, process innovations could be perceived as a lens to analyze the broader phenomenon of organizational capability building, which includes how firms create, implement, and replicate new operating routines (Pisano 1994; Piening & Salge 2015). Thus, the topic of this research being process innovations is a contribution to extant literature itself. This research reveals the explored microfoundations for process innovation capabilities and, thus, gives insight to some of the above-mentioned gaps in the literature. For example, the explored microfoundations reveal how this specific case organization is on its way to become a process innovator. In addition, this research reveals some of the organizational and managerial activities through which the case organization introduces process innovations.

Within strategy literature the notion of microfoundations was arguably first applied by Lippman and Rumelt, who presented the microfoundations of the resource-based view (Lippman & Rumelt 2003; Foss & Pedersen 2016). Albeit the demand for microfoundations in strategy dates back more than a decade, the microfoundational work did not take off properly until 2010 (e.g. Foss & Pedersen 2016). Since then, various authors have stated that there are frequent calls for microfoundations and related empirical work in strategy and other fields (e.g. Lippman & Rumelt 2003; Felin & Foss 2005; Felin *et al.* 2012; Barney & Felin 2013; Felin *et al.* 2015). In addition, as many of the other previously mentioned scholars, Felin and colleagues (2012, p. 1351) highlight the fact that despite the progress that has been made in understanding routines and capabilities, the underlying microfoundations have not received appropriate attention. We do know, however, that microfoundations approach allows to deepen the understanding of the

components underlying routines and capabilities and to explore how these components interact within or across categories to reveal how the differences arise and contribute to the heterogeneity of firms (e.g. Felin & Foss 2005; Teece 2007; Foss 2009; Felin *et al.* 2012*;* Foss *et al*. 2012; Barney & Felin 2013; Felin *et al.* 2015; Foss & Pedersen 2016). To conclude, the aspects mentioned above act as a strong motivational factor for the microfoundational research agenda applied in this thesis. At the same time, approaching the theme of process innovations from the perspective of microfoundations adds to the extant literature regarding microfoundational exploration as well.

Furthermore, Piening and Salge (2015) mention that even though their dynamic capabilities approach adopted a firm-level perspective, they acknowledge that the role of human agency is an important factor in this line of research. This adds to the relevancy of this research's microfoundational approach, which emphasizes the individual-level on process innovation capabilities. In addition, Piening and Salge (2015) mention that an example of an approach for studying process innovation could include how individuals' skills, attitudes, and behaviors shape the execution and performance effects of firms' innovation-related activities. Thus, the microfoundational approach of this thesis is appropriate for studying the antecedents of process innovation capabilities and the relationship of human agency. Additionally, as mentioned, the importance of fostering innovation among shop-floor employees is increasingly recognized, but there is little empirical research done on the topic (Axtell *et al.* 2000). The perspectives of shop-floor employees were also present in this research and, thus, this research also gives some insight into the line of research. However, in the end, this thesis addresses the individual-level more holistically.

Furthermore, Foss and Pedersen (2016) mention that typical microfoundational questions are related to, for example, understanding dynamic capabilities in terms of managerial cognition, the motivational antecedents of human capital-based competitive advantage, how individual action and interaction constitute the capabilities that drive performance, and how routines emerge from such individual action and interaction. In addition, Crossan and Apaydin (2010) call for multilevel research that examines the relationship among variables that exist at different levels, such as, individual, group, or organizational levels. This is where the microfoundational approach comes in as a convenient way to approach the problem. This statement links this microfoundational approach straight to the questions and gaps related to process innovation capabilities. In addition, Coleman (1990, p. 3) argues that explanations that involve the micro-level have the features of being more constant, constitutional, and generic than mere macro-level explanations (as cited in Felin *et al.* 2012). To elaborate further, this research also emphasizes many aspects of the interactions of individuals and contextual factors, which are discussed in more detail in the Chapter 5 and Subchapter 6.2.

As mentioned, employee innovation emerges from the interaction of personal and contextual factors, such as individual characteristics, intrinsic job factors, group factors, relationships at work, and organizational factors, which either encourage or inhibit employee's innovation related activities (Janssen 2005). To outline, there are various contextual and individual factors contributing to employee innovation and the complexity increases when analyzing the interactional factors that emerge from the combinations of contextual and relational factors. Furthermore, this research has interactionist perspective, which suggests that employee innovation emerges from the interaction of personal and contextual factors, which can either encourage or inhibit employee's innovation related activities (Janssen 2005). So, in addition to the individual and the interactions among individuals, the contextual factors are recognized as important in determining the overall innovation related behavior. To note, there has been initiatives to explore the determi-

nants that influence employee IWB, but despite the advances the results are still limited. (Černe *et al*., 2014; Shalley and Zhou, 2008 as cited in Maqbool *et al.* 2018) Thus, this research also gives some insight into the most important contextual factors related to IWB, process innovation capabilities and innovation culture. Examples of these factors are management practices and resources. These are discussed in more detail in the Chapter 5 and Subchapter 6.2.

In addition to the above discussed topics, this research gives insight into the digitization of innovation. To elaborate, digitalization has penetrating effects on innovation, which results in a critical need for novel theorizing on digital innovation management (Nambisan *et al.* 2017, p. 223). Furthermore, the research area for the effects of digital tools for innovation is at its infancy. The presented research of the impacts of IT by Huesig and Enders (2019) also focuses merely on the NPD and neglects, for example, process innovations. This theme is relevant for this thesis, since the second supporting research question aims to explore the effects of innovation management software on individual's innovative behavior. Integrated to the broader context of this thesis, the focus is on the exploration of the influence of IMS tools on the microfoundations of process innovation capabilities, for example, in the form of individual behavior. To the author's knowledge, this is yet an unexplored field.

The effects of digitalization have led scholars to doubt the explanatory power and usefulness of extant innovation theory and related organizational scholarship (Benner & Tushman 2015; Nambisan *et al.* 2017, p. 223). Furthermore, Trantopoulos and colleagues (2017, p. 295) suggest that top management of manufacturing firms should expect that investing in communication platforms that allow employees to connect and exchange ideas online and offline should enhance the productive use of externally sourced knowledge for process innovation. In addition, the authors have identified that those manufacturing firms, which aim to enhance process innovation performance, should search deeply from various external knowledge sources (Trantopoulos *et al.* 2017). This thesis also discusses the communication and online idea exchange from the perspective of the case organization. In addition, the potential of integrating external knowledge sources to the software are acknowledged and thought, but not yet implemented. Thus, the perspective is on internal crowdsourcing.

Furthermore, studies regarding the pharmaceutical industry have mainly focused on product innovation or the discovery and development of new drugs, rather than process innovations that are generally more related to changes in the manufacturing processes (Lugovoi *et al.* 2018). However, on behalf of the value of process innovation speaks its role in supporting product innovation and overall operational performance of, for example, the production processes (De Figueiredo & Kyle 2006; Ballot *et al.* 2015) In addition, it should be acknowledged that manufacturing is a far greater cost driver for the pharmaceutical industry than is generally acknowledged (Price 2013, 2014).

To summarize, this research has wide contribution network to existing literature in various disciplines and topics. The process innovation concept itself requires more in-depth exploration as does the microfoundational approach adopted in this research. In addition, the overall human agency underlying routines and capabilities and how the macro-level context influences the micro-level are also important contributions. Furthermore, in existing literature, there have been attempts to explore the determinants that influence employee IWB, but those results are still limited. This research reveals some aspects related to that topic as well. Also, last but not least, this research highlights the effects of digital innovation management software, which connects all the employees within the organization to process innovation related activities. This research area for the effects of digital tools for innovation is at its infancy. To conclude, studying all of the above within a pharmaceutical manufacturing environment adds to the list of contributions.

6.2 Main Findings

The main findings related to the goal of this thesis are the explored and identified microfoundations of process innovation capabilities of a multinational corporation's pharmaceutical Supply Center. The goal incorporated individual-level emphasis, which was visible through the two supportive research questions. The questions focused on the individual-level mechanisms to innovate and revealing the effects of innovation management software on individuals' innovative behavior and, thus, on process innovation capabilities. This subchapter aims to provide the summary of the main findings. The more detailed results are presented and discussed in the previous Chapters 4 and 5.

The explored microfoundations of process innovation capabilities highlight how this specific case organization is on its way to become a process innovator. In addition, this research reveals some of the organizational and managerial activities through which the case organization introduces process innovations. The highlighted microfoundations are presented in the Table 13 below. To note, culture and atmosphere supportive of innovation are collective outcomes and despite being highly important for process innovation capabilities, they are not included in the table below. However, in the light of the main findings the importance of culture and atmosphere for innovation should be emphasized. Identified features of enabling culture and atmosphere included openness, collaboration, low hierarchy, psychological safety, organizational support, organizational confidence, agile organization, learning from mistakes, and experimentation.

Table 13. *Main findings of the explored microfoundations for process innovation capabilities.*

Level or Details	Microfoundation
Organization-wide Digital Innovation Management Software (IMS)	The utilization of internally crowdsourced digital innovation management software has various positive and supportive effects on process innovation capabilities. For example, co-creation of ideas, encouraging and motivating employees, and managing the implementation of innovations.
Management	Strategic process innovation management activities with an emphasis on sufficient resource allocations and goals to enable innovations.
Management	Dynamic and entrepreneurial leadership with sensing, seizing, and reconfiguring capabilities.
Management	Sensing and seizing Open Innovation possibilities and enabling external knowledge absorption.
Management	Integrating process innovation related activities with new product development activities to sense and seize opportunities at the right time.
Management	Management behavior, attitude, and activities aimed at encouraging and empowering employees, such as, supportive internal communication, rewards, and trust.
Management	HR capabilities with an emphasis on recruiting the right people and keeping them satisfied and wellbeing.
Management	Project management capabilities ensure, for example, implementation success.
Individual	Expertise, as in knowledge combined with experience.

Individual	Creativity skills, as in cognitive abilities combined with individual creativity.
Individual	Task motivation, as in curiosity combined with other sources of motivation.
Individual	Social intelligence, as in individual's relational ability to engage or interact with other individuals.
Individual	Individual's sensing and seizing abilities.
Individual	Open, development-oriented, problem solving-oriented, and experimentation-oriented.
Individual	Courage to question the status quo and sufficient amount of diversity and conflict among employees to foster idea generation.
Individual	Relationships and encounter possibilities in different knowledge creation contexts to foster collaboration and innovation.
Individual	Self-efficacy, as in one's ability to have confidence and control their environment and behavior.
Individual and/or Collective	Organization-wide routines that are related to generating, acquiring, and integrating knowledge. For example, daily performance dialogues, gemba walks with different agendas, and standardized systematic problem-solving workshops.

This thesis sheds light into the individual agency related to routines and capabilities. As Piening and Salge (2015) mention, an example of an approach for studying process innovation could include how individuals' skills, attitudes, and behaviors shape the execution and performance effects of firms' innovation-related activities. This summarizes the perspective utilized in this research and, therefore, this research can be acknowledged to bring more insight into the topic. In addition, the importance of fostering innovation among shop-floor employees is increasingly recognized, but there is little empirical research done on the topic (Axtell *et al.* 2000). This research scratches the surface of this topic, too. However, this thesis concentrates more holistically on the whole individual-level within the organization. In addition, this research provides information on the topic of the determinants that influence employee IWB, which are said to be limited (Černe *et al*., 2014; Shalley and Zhou, 2008 as cited in Maqbool *et al.* 2018).

Not only does the research focus on human agency, but it also examines relationships among variables that exist at different levels, such as individual, group, or organizational levels. For example, Crossan and Apaydin (2010) have made calls for this kind of multilevel research. However, the focus of this thesis was more on the individual-level. Furthermore, Foss and Pedersen (2016) mention that, typical microfoundational questions are related to, for example, understanding dynamic capabilities in terms of managerial cognition, the motivational antecedents of human capital-based competitive advantage, how individual action and interaction constitute the capabilities that drive performance, and how routines emerge from such individual action and interaction. This statement can be said to summarize the main research questions and goals of this research. The empirical results and the discussion incorporate various aspects that are emphasized within the statement.

As mentioned, digitalization has all-embracing effects on innovation, which results in a critical need for novel theorizing on digital innovation management (Nambisan *et al.* 2017, p. 223). In addition, the research area for the effects of digital tools for innovation is at its infancy. The pre-

sented research of the impacts of IT by Huesig and Enders (2019) also focuses merely on the NPD. This thesis explored the effects of innovation management software on individual's innovative behavior. Thus, this research provides initial information about the effects of IMS tools on the microfoundations of process innovation capabilities, for example, in the form of individual innovative work behavior. This provides new information to the IWB research as well. The effect of digitalization has led scholars to doubt the explanatory power and usefulness of extant innovation theory and related organizational scholarship (Benner & Tushman 2015; Nambisan *et al.* 2017, p. 223). Altogether, as the digitalization movement advances, this topic becomes even more fertile soil for future studies related to, for example, innovation management.

6.3 Reliability and Validity

Where Chapter 3 justifies the use of research methods for this thesis, this subchapter discusses the errors and biases linked to them. Reliability and validity are important factors when assessing the quality of a research in the natural sciences and quantitative research in the social sciences. However, their role regarding qualitative research has been challenged. Traditionally reliability refers to the replication and consistency of a research. In addition, sometimes a distinction is made between internal and external reliability. Internal reliability refers to establishing consistency during the research project. Sometimes internal reliability is sought, for example, by using more than one researcher to conduct interviews or observations. (Saunders *et al.* 2017, p. 202) In this research, the researcher aimed to reach consistency by writing notes and memos of certain phases of the research, such as the codification, analysis, and interpretation of the data. External reliability, on the other hand, refers to whether the data collection techniques and analytic procedures would produce consistent findings if they were repeated by the researcher another time or if they were conducted by another researcher (Saunders *et al.* 2017, p. 202). In this research, the researcher acknowledges some threats to the reliability of the research.

Saunders *et al.* (2017, p. 203) suggest that four types of threats to reliability exists. These are participant error, participant bias, researcher error, and researcher bias. Next, each of these possible threats will be discussed in more detail in the context of this research. *Participant error* can be related to any factor which negatively alters the way a participant operates (Saunders *et al.* 2017, p. 203). In this research it is possible that there have been factors that could have altered the way interviewees respond. These include, for example, distracting situation in their private lives or otherwise stressful or busy situation related to work. However, according to the observations of this researcher, there was not too much relentlessness among the interviewees. Moreover, the researcher aimed to choose a location, which would enhance the possibility for fewer distractions. *Participant bias* is any factor, which induces a false response (Saunders *et al.* 2017, p. 203). In this research, one of the possible sources of such bias is related to the relationship between the researcher and the interviewees. The researcher acknowledges that, since she has been working on improving the innovation related aspects in the organization, some participants might want to paint a more positive picture of the reality for the researcher. However, the relationship could also be recognized as a possible positive factor, since it may increase the required trust to dig deeper into some subjects.

Researcher error indicates any factor, which alters researcher's interpretation. Traditionally sources of this kind of bias might origin from the tiredness, lack of preparation, and misunderstandings regarding some subtle meanings of the interviewees. (Saunders *et al.* 2017, p. 203) Researcher error is, of course, a possible source of error in this research, too. However, the researcher did get a rush of energy at the beginning of each interview, since the situation can be considered as exciting. In addition, the researcher aimed to always prepare herself for the

next interview and never scheduled another interview straight after. There was always at least one-hour time gap to relax and prepare for the next interview. Moreover, the researcher identifies herself as empathetic and, thus, feels that she can also pick up on subtle meanings. Nonetheless, the possibility of some researcher error does exist, but the possibility is low and does not have important consequences in terms of the findings.

The last threat to reliability is named as *researcher bias*, which indicates any factor that induces bias in the researcher's recording of responses. For example, a researcher could allow her own subjective view to interfere the recording and interpreting responses of the participants'. (Saunders *et al.* 2017, p. 203) This is a possible source of researcher bias also in this research. Especially, since the researcher has been working on with innovation related tasks and, thus, has her own viewpoints on some of the related aspects. However, the researcher always aimed to be as unbiased as possible. Saunders *et al.* (2017) highlight that one key aspect is to ensure that the research process is clearly designed and evaluated and does not contain, for example, logic leaps or false assumptions. Therefore, the researcher aimed to report the research process as transparently as possible in the Chapter 3. This ensures that the readers of this thesis can also make judgements themselves.

As mentioned earlier, also the validity of the research is important. Validity is the appropriateness of the measures, accuracy of the results, and overall generalizability of the findings (Saunders *et al.* 2017, p. 202). Saunders *et al.* (2017) highlight three types of validity: measurement validity, internal validity, and external validity. Here, we will follow the discussion with internal and external validity. *Internal validity* can be said to be established when a research accurately demonstrates a causal relationship between two variables. Unfortunately, this kind of validity cannot be properly associated with an exploratory research as this one. (Saunders *et al.* 2017. p. 203) However, this research does discuss possible causal relationships, but in a qualitative setting. To note, sometimes the adaptation of the concept of internal validity to qualitative research is not seen as a problem. This is due to the in-depth nature of qualitative methods, which enable to ground the propositions with a rich collection of data. (Saunders *et al.* 2017, p. 205)

The *external validity*, on the other hand, is concerned with the generalization of the results (Saunders *et al.* 2017. p. 204). Also, the adaptation of external validity to qualitative research has been questioned, since the small samples typically limit the generalizability of such studies. However, other ways have been utilized to demonstrate the generalizability of qualitative studies. (Saunders *et al.* 2017. p. 205) For example, findings from one qualitative setting could be generalized across other similar settings or where learning from the research setting can be applied in other settings (Buchanan 2012 as cited in Saunders *et al.* 2017, p. 205) In the case of this research, it should be noted that the research is based on an in-depth study of a single case organization. Thus, the results cannot be recognized to be highly generalizable.

However, the results could be recognized as more generalizable within certain limits, for example, within pharmaceutical manufacturing industry. It is also possible that some of the process innovation related aspects are generalizable beyond the boundaries of pharmaceutical manufacturing. For example, some of the individual-level explorations, such as motivational factors and managerial practices, could be recognized as more generalizable. It should be noted that qualitative research is not necessarily intended to be replicated, because it will reflect the socially constructed interpretations of participants in a particular setting at the time (Saunders *et al.* 2017, p. 205). This acknowledgement is also important for this research, considering that the research aims to explore microfoundations of process innovation capabilities, which are bound to the organization.

So far, we have discussed the concepts of reliability and validity, even though we have recognized that they are not always suitable for the evaluation of qualitative studies. Alternative quality criteria are *dependability*, *credibility* and *transferability*. These criteria will be discussed next. Dependability can be recognized as a parallel criterion to reliability. In interpretivist research the focus is likely to be altered during the research process and, thus, all the changes need to be recorded to ensure the research can be understood and evaluated by others. (Saunders *et al.* 2017, p. 206) In the case of this research, the focus did not alter much during the process. Furthermore, the whole process is documented precisely in the Chapter 3. In addition, one response to the issue of dependability is the recognition that semi-structured interviews are not necessarily even intended to be repeatable, since they reflect reality at the time of the data collection (Saunders *et al.* 2017, p. 398). Thus, an attempt to assure that qualitative non-standardized research could be replicated by others would not be realistic or even feasible without the destruction of the strengths of this type of research (Saunders *et al.* 2017, p. 399). Based on this, and the fact that the whole research process including the methods and assumptions are well documented and transparent, it can be acknowledged that there is sufficient information to show that the findings are dependable.

Credibility, on the other hand, is a parallel criterion to internal validity. The emphasis is on ensuring that the representations of the interviewees' socially constructed realities match what the participants intended. Some techniques to ensure this match are, for example, lengthy research involvement in order to build trust and rapport and to collect acceptable data. (Saunders *et al.* 2017, p. 206) As mentioned previously, in this research the interviewer had previous professional relationships with most of the interviewees and, thus, some form of initial trust had been established already prior to the interviews. In addition, the researcher aimed to collect a sufficient heterogeneous sample in order get a more realistic interpretation of the situation of the overall organization. Another way to ensure the match between the representations is to make sure that the researcher's initial expectations about the results of the research are not privileged over the social constructions of the participant by regularly recording these and challenging them during the analysis of the data (Saunders *et al.* 2017, p. 206). The researcher aimed to succeed in holding her initial judgements from the data acquired from the participants. However, she did not check the interpretations with the participants, because she saw that it could also possibly negatively affect the data.

Another way to ensure higher credibility is to provide initial information before the interview (Saunders *et al.* 2017, p. 402). In this research, the researcher provided the participants with a minimal amount of prior information about the overall topic of the interviews. This was due to the fact that the researcher wanted to have full control over the interview situation. Meaning that this way there would be no prior judgements regarding the topic or the questions, and the researcher would have more control to explain what she means with her question and to elaborate the meaning of unclear terms. However, afterwards the researcher understands that providing more prior information about the themes could have possibly allowed time to be saved and perhaps some even more detailed answers to be acquired. Thus, the researcher acknowledges the value in providing prior information, too. However, from experience, the researcher also acknowledged that prior information would possibly only be read by some of the participants. This could result in differentiation in the setting of the research. This way the researcher knew that the answers were not rehearsed and did not contain prior judgement.

The parallel criterion for external validity is *transferability* or *generalizability*. A full description of the research question, design, context, findings, and interpretations provides the reader with the opportunity to judge the transferability of the study to another setting. (Saunders *et al.* 2017, p.

206) The researcher of this thesis aimed to provide in-depth description of the above-mentioned features of the research. These are presented in the Chapter 3. Furthermore, the researcher aimed to discuss the quality of the research with depth to ensure providing sufficient information for the reader. However, in order to achieve proper generalizability, more tests, data, and analysis are needed. In the case of this research this is not an issue, since the nature is explorative and the some of the theoretical contributions are emergent.

To note, *triangulation* is often used method to confirm the validity, credibility, or authenticity of the research, analysis, and interpretation (Saunders *et al.* 2017, p. 207). The purpose is to use two or more independent sources of data and methods of collection within one study to assure that the data is telling the researcher what the researcher thinks it is telling. In a research, which is based on positivist assumptions, it will help to reveal the "reality" within the data. However, interpretivist researchers challenge this outcome as they consider that studies involving people's beliefs, attitudes, and interpretations, the reality is socially constructed and varied. (Saunders *et al.* 2017, p. 207) In the case of interpretivists, the value in triangulation relates more to the fact that it adds depth, breadth, complexity, and richness (Denzin 2012; Denzin and Lincoln 2011 as cited in Saunders *et al.* 2017, p. 207). This research is based on a mono-method qualitative study, but during the research the researcher made her own observations and notes, too. In addition, the researcher had prior history within the topic and organization. This is not necessarily sufficient for traditional triangulation. However, the researcher saw that regarding the topic and explorative aim of this thesis, it was appropriate to rely on mere interview results.

To note, in this case there was a vast qualitative data, which provided depth, breadth, complexity, and richness in the form of 23 semi-structured and open-ended interviews. Another source of data is, however, a factor that could be considered as something to add to gain the benefits of proper triangulation. Saunders *et al. (*2017, p. 397) mention the lack of standardization in semi-structured and in-depth interviews as possible factor for worries about reliability or dependability. In qualitative studies this is related to whether alternative researchers would reveal similar information (Saunders *et al.* 2017, p. 397). During the interviews of this research, the questions, the contents of the questions, and the order of the questions were varied from setting to setting. Thus, the interviews were not standardized. However, this was seen as adding to the quality of the data, but at the same time makes the study less dependable. Nonetheless, as mentioned earlier, the issue of dependability is the recognition that semi-structured interviews are not necessarily even intended to be repeatable, since they reflect reality at the time of the data collection (Saunders *et al.* 2017, p. 398). Therefore, the lack of standardization of the structure of the interviews is not seen as a real issue.

Interviewer bias is related to comments, tone, or non-verbal behavior of the interviewer, which creates bias. This can be perceived as influencing the way interviewees respond to the questions. This could be present, because the researcher attempts to impose his or her own beliefs and or frame of reference through the questions she or he asks. In addition, it could be perceived in the way the researcher interprets responses. (Saunders *et al.* 2017, p. 397) In this research, the researcher did try to ease the interviewees into the subjects and clarify some issues that came up during the interviews. Thus, it is possible that the researcher could have influenced the results of the answers by leading the interviewees too much. However, on the other hand, this way the researcher might have ensured the in-depth qualitative data, which ensured the microfoundational exploration. Saunders *et al.* (2017, p. 400) also mention that semi-structured interviews can achieve a high level of validity or credibility, when conducted carefully using clarifying questions, probing meanings, and by exploring responses from variety of angles. This is exactly what the researcher of this thesis aimed to do during the interviews.

Another source of bias related to the above-mentioned interviewer bias is *interviewee or response bias*. It can be caused by interviewees' perception about the interviewer, or perceived interviewer bias. In addition, the whole process of being interviewed can be recognized as an intrusive process. This is especially true in the case of semi-structured interviews, which focus on exploring events or seeking explanations. (Saunders *et al.* 2017, p. 397) As mentioned, the researcher acknowledges that in some instances the interviewees could try to answer more positively for the researcher, since she has been working on with improving some of the aspects related to the questions. However, the researcher does not recognize that this would be a proper problem regarding the explorative aim of this thesis. However, some other problems could be related to the familiarity. Saunders *et al*. (2017, p. 208) mention that the researcher is not able to ask simple questions, since the participants think the researcher should already know the answers. In addition, Saunders and colleagues mention about problems with statuses. However, in the case of this research, the researcher was perceived as a subject matter expert in the field of innovation related activities within the organization. Additionally, as empirical results show, the organization has low perceived hierarchy. So, in fact, the researcher did not perceive these downsides during the interviews.

As we have mentioned in the previous paragraphs, the role of the researcher has meaning, too (Saunders *et al.* 2017, p. 208). In this case, the researcher has been an *internal researcher.* As an internal researcher, the researcher of this thesis had easy access to the case organization. In addition, she had the advantage of having prior knowledge to be able to properly understand the emergent complexities during the research. Moreover, it is easier for an internal researcher to understand the context (Saunders *et al.* 2017, p. 208) and in this kind of explorative study it was of great importance. However, as mentioned, these benefits come with detriments. The researcher has to be very conscious of the assumptions and preconceptions she has accumulated (Saunders *et al.* 2017, p. 208). In a worst case, this could prevent the researcher from exploring issues that would otherwise enrich the research (Saunders *et al.* 2017, p. 208). Most important is for the researcher to acknowledge that we make assumptions at every stage in our research, whether we are consciously aware or not (Burrell and Morgan 1979). Therefore, the researcher in this thesis tried to be reflective and aware of her own role and assumptions that are inevitably made during the whole research process.

Next, there will be a summary of the development areas the researcher identified. First of all, after conducting the research, the researcher felt that perhaps the focus of this research was too broad. However, the researcher was ambitious and wanted to gain an in-depth, yet holistic, understanding of the microfoundations of process innovation capabilities. Thus, she felt she needs to study both, the context and the individuals. Naturally, the emphasis was on individuals, but the context is also a relevant factor in this line of research. However, it is possible that some of the areas could have been explored even in more depth without this ambitious mindset. On the other hand, the researcher would have felt that with the context missing, the results would not have had as much value. In addition, the researcher wants to note that, the research topic was not straightforward or easy. Many of the concepts that were used are complex and also widely debated. For example, even though the discussion is not new, scholars are still struggling to reach a consensus of what microfoundations really are and are not (e.g. Felin & Foss 2005; Foss 2009; Felin *et al.* 2012; Foss *et al*. 2012; Barney & Felin 2013; Foss & Lindenberg 2013; Winter 2013; Felin *et* al. 2015; Foss & Pedersen 2016). Thus, the researcher had to make her own theorization and assumptions of the existing theory as well. To conclude this subject, the researcher sees that when studying a broad subject from various angles, it is crucial to have a detailed agenda and focus.

To summarize, it should be kept in mind that all the choices made and explained in the Chapter 3 have implications to the dependability, credibility, and transferability of the research. To remind, Saunders *et al.* (2017, p. 124) have introduced different types of assumptions, which are the realities the researcher encounters in his or her research (ontological assumptions), human knowledge (epistemological assumption), and the degree and ways the researcher's own values influence his or her research process (axiological assumptions). These assumptions shape how the researcher understands the research questions, the methods that are used, and how the findings are interpreted (Crotty 1998 as cited in Saunders *et al.* 2017, p. 124). Thus, consistent set of assumptions will constitute a credible research philosophy, which supports the researcher's methodological choice, research strategy, and data collection techniques and analysis procedures (Saunders *et al*. 2017, p. 124). Furthermore, the interpretivist research philosophies are typically combined with inductive methods, small samples, in-depth investigations, and qualitative methods (Saunders *et al.* 2017, p. 136). This was also true in the case of this research. To conclude, the research was designed with care and all the important aspects related to the designing of a research were taken into account. This subchapter has elaborated more on the implications of these decisions and actions on the quality of the research.

6.4 Managerial Implications

Managers cannot intervene directly on the level of capabilities. However, managers can influence the micro-level of capabilities, for example, by hiring key employees or by changing recruitment policies and rewards systems (e.g. Foss 2009, p. 15; Foss & Lindenberg 2013; Foss & Pedersen 2016). This can be acknowledged to be the essence of the motivation of this research. Gaining understanding of the microfoundations for process innovation capabilities provides more understanding for managers to build and influence the desired underlying microfoundations, routines, and capabilities. In addition to the presented theoretical contribution, the researcher provided the case organization with practical implications to advance their process innovation capabilities. In this case, these were recognized to be sensitive information and, thus, they will not be elaborated in this thesis. However, this thesis offers plenty of other valuable information for managers, too.

First, the findings reveal information about the perceived value of process innovation especially in the pharmaceutical manufacturing environment. However, some of the results can also be recognized as generalizable beyond the industry of the case organization. Second, the thesis identified microfoundations, which give guidance on relevant areas to master for building and advancing process innovation capabilities. Furthermore, the results in this thesis emphasize the meaning of fostering continuous improvement and continuous innovation throughout the whole organization.

Third, the research explored various factors related to innovative work behavior. The results reveal several individual attributes, motivational factors, and organizational conditions that were linked with innovative work behavior, continuous innovation, and process innovation capabilities. This information gives guidance for managers to enhance the organization-wide motivation and, thus, foster process innovation capabilities at all levels of the organization. In addition, the research highlights the overall positive effects of digital tools for fostering co-creation, continuous innovation, and managing the implementation of innovation. In addition, the digitized innovation process can be perceived as providing visibility to enhance the possibilities of acquiring necessary sponsors and backers for ideas. Furthermore, the decentralization of decision-making authority and the dispersion of power have been recognized as a necessity for innova-

tion (Thompson 1965 as cited in Damanpour 1991, p. 558). However, most importantly, the internally crowdsourced innovation management software was recognized to be able to change the overall organizational culture more innovation oriented.

To conclude, Table 13 in the Subchapter 6.1 summarized the main factors that were found to be the microfoundations of different level process innovation capabilities. Thus, the results give guidance on which areas to focus when aiming to build process innovation capabilities. Some of the microfoundations are more related to lower level process innovation capabilities than others. For example, managerial sensing and seizing abilities are more related to dynamic process innovation capability than, for example, fostering shop-floor process innovation.

6.5 Future Research

Due to various reasons, the subject of the thesis was quite challenging. First of all, as mentioned, a highly important aspect to consider is that even though the microfoundational discussion is not new, scholars are still struggling to reach a consensus of what microfoundations really are and are not (e.g. Felin & Foss 2005; Foss 2009; Felin *et al.* 2012; Foss *et al*. 2012; Barney & Felin 2013; Foss & Lindenberg 2013; Winter 2013; Felin *et al.* 2015; Foss & Pedersen 2016). This was also a part of the challenge when conducting the research of this thesis. Therefore, the researcher states that there is still need for proper theorization on the topic. A clearer theorization would enhance the possibilities of real progress in the field. The theory of the microfoundational approach should also seek new ways of approaching the subject. For example, the field could be further advanced with integrating more psychology and organizational behavior to the extant theories and concepts. Furthermore, the theory should be more concerned about the different levels within the organization. To summarize, the field needs contribution from other disciplines.

Furthermore, due to the unclear nature of the topic of microfoundations and different levels of capabilities, it was challenging for the researcher to distinguish the different levels of capabilities and their respect microfoundations. For example, do explaining dynamic capabilities require the same microfoundations as explaining ordinary capabilities? How to explain collective outcomes? As has been discussed in the Chapter 2, the extant literature vaguely states that different level capabilities can also have different microfoundations (e.g. Felin *et al.* 2012). In addition, microfoundations for routines and capabilities can indicate various conceptually different processes, for example, the emergence, maintenance, or reproduction, change, and displacement of routines and capabilities (e.g. Felin *et al.* 2012, p. 1357). Therefore, it can be stated that the extant theory is widely debated and lacks consensus on highly important topics. However, despite the shortcomings of the microfoundational approach, it still steers the conversation to the right direction – from macro-level to the micro-level, closer to the actual individuals underneath the routines and capabilities. Thus, to clarify, the researcher distinguishes the microfoundational approach as highly beneficial, but emphasizes the lack of clear theorization.

Further research should also be done on process innovation capabilities and the effects of digitalization on innovation. The discussion in this thesis is limited to specific cases within pharmaceutical manufacturing industry and, therefore, more generalizable studies are needed.

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